



Calvin J. Lonsink



Land Use Capacity and Management Philosophies for Alaska

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT



US FISH & WILDLIFE SERVICE--ALASKA

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LAND USE CAPACITY AND MANAGEMENT PHILOSOPHIES
FOR ALASKA--A STUDY

ARLIS
Alaska Resources
Library & Information Services
Anchorage, Alaska

Prepared by:

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LAND USE CAPACITY AND MANAGEMENT PHILOSOPHIES
FOR ALASKA--A STUDY

SUMMARY

One of the current issues of land use planning in Alaska is focalized on the distribution patterns of land ownership and related management philosophies, particularly on those lands to be retained in the Federal ownership. While the issue can be confused by the self-perpetuating traits of Federal agencies, the problem of planning and managing the Federal lands in Alaska is important enough to encourage and justify competitive planning studies.

This report, then, illuminates the range of choices on where the permanent reservation in Federal ownership should be located and for what purposes these Federal lands should be managed. It is based on a study conducted by the Bureau of Land Management in Alaska.

The study, at its origin, was directed to (1) define the manageable units; (2) identify the resource management opportunities; and (3) provide a basis for identifying the areas to be retained in Federal ownership under different management philosophies.

The thrust of this study is an inductive and systematic approach to gather and analyze the informational material covering not only the lands withdrawn under the Alaska Native Claims Settlement Act, but generally most of the lands in Alaska without regard to man-made proprietary lines on a map. Land use forms, rather than dictated by functions reflected in the proprietary interest, are then tested or grouped according to implied use capacity and management philosophy.

As a basis for decision making, the analytical process provides for an overlay series of physical and biological information maps, resource inventory maps, an ecologically oriented land use suitability map, a summary trailer of the salient resource features and predominant management opportunities for each manageable unit identified, regional assessment, and an economic supplement.

CONCLUSIONS

The natural processes of physical and biological systems (ecosystems) which are occurring on land do not necessarily accommodate themselves to the artificial boundaries and restrictions imposed by law and political economy. It is possible that decisions relative to fulfilling the Alaska Native Claims Settlement Act (ANCSA), like the act itself, will be based on historically derived legal, economic, and political assumptions.

The results of such decisions in the past have largely increased the stress of human demands upon the land and tended to displace natural processes and impair the capacity of ecosystems for self-renewal. While it is necessary to cope with land use and policy in the context of laws, public attitudes, and economic arrangements, there is a larger and ultimate context--the condition of land as the base for human welfare and survival--with which laws and governments must finally address.

Public policy and land management based on knowledge of ecosystems is not anti-people. To the extent that man can identify the opportunities and restraints for the use of land and its resources, he can further his creative role in working with nature. In the long run, economic growth and resource development and use can be maximized only if man learns to protect the resource base from shortsighted and ruinous exploitation. Thus this approach to land policy is not to return all lands to nature--human welfare, now and in the future, is ultimately dependent on the viability of the life-supporting systems.

In Alaska, where natural ecosystems remain largely unaffected by man, there is still an opportunity for this approach. Land management policy decisions made in Alaska, at all levels of government and by the native villages and corporations, should be based on the identification, understanding, and management of natural capacity of the land base.

With the initial distribution of land ownership patterns already established by the Alaska Native Claims Settlement Act and the Alaska Statehood Act, the problem on how the Federal land ownership is grouped and coordinated for management under the administration of the various Federal agencies becomes a pressing issue. Rather than fitting or permitting the functions of an agency to dictate the land use forms for a given land area, what is needed is a systematic test or an inductive process which provides an analysis on Alaska's resource management opportunities without regard to man-made lines on maps. The implied use capacity and management philosophy flowing from such an assessment can then be correlated and grouped along functional lines and along a regional and subregional strategy for management of Alaska's resource base.

The Bureau of Land Management's study, using this process, has defined or grouped the land areas, with exception of the Southeastern region, into 28 manageable units. The study's ultimate usefulness can be tested in the regional context of the present and future land ownership distributions of the Native Villages and Regional Corporations, and local, state, and Federal governments.

The Bureau of Land Management believes it is imperative to present this case to the Secretary before long-range land management options are foregone through decisions made for the national interest study area and classification for public interest area under Section 17(d)(2) and (d)(1) of the Alaska Native Claims Settlement Act.

RECOMMENDATIONS

For application with this part of the study, an overlay (transparency) map with the grouping of the 28 manageable units and a second transparency map depicting the area-wide recommendations for management under the multiple use philosophy are shown under the respective titles "Manageable Units" and "Designation by Management Objectives."

Based on the analysis provided from this study, the Bureau of Land Management recommends that the public lands encompassed within manageable units 1a, 2, 5, 7, 8, 9, 10, 11, 12, 15, 16, 18, 19, 23, and 24 be managed under the multiple use principles, and those within the remainder of the units be managed under the limited use principles.

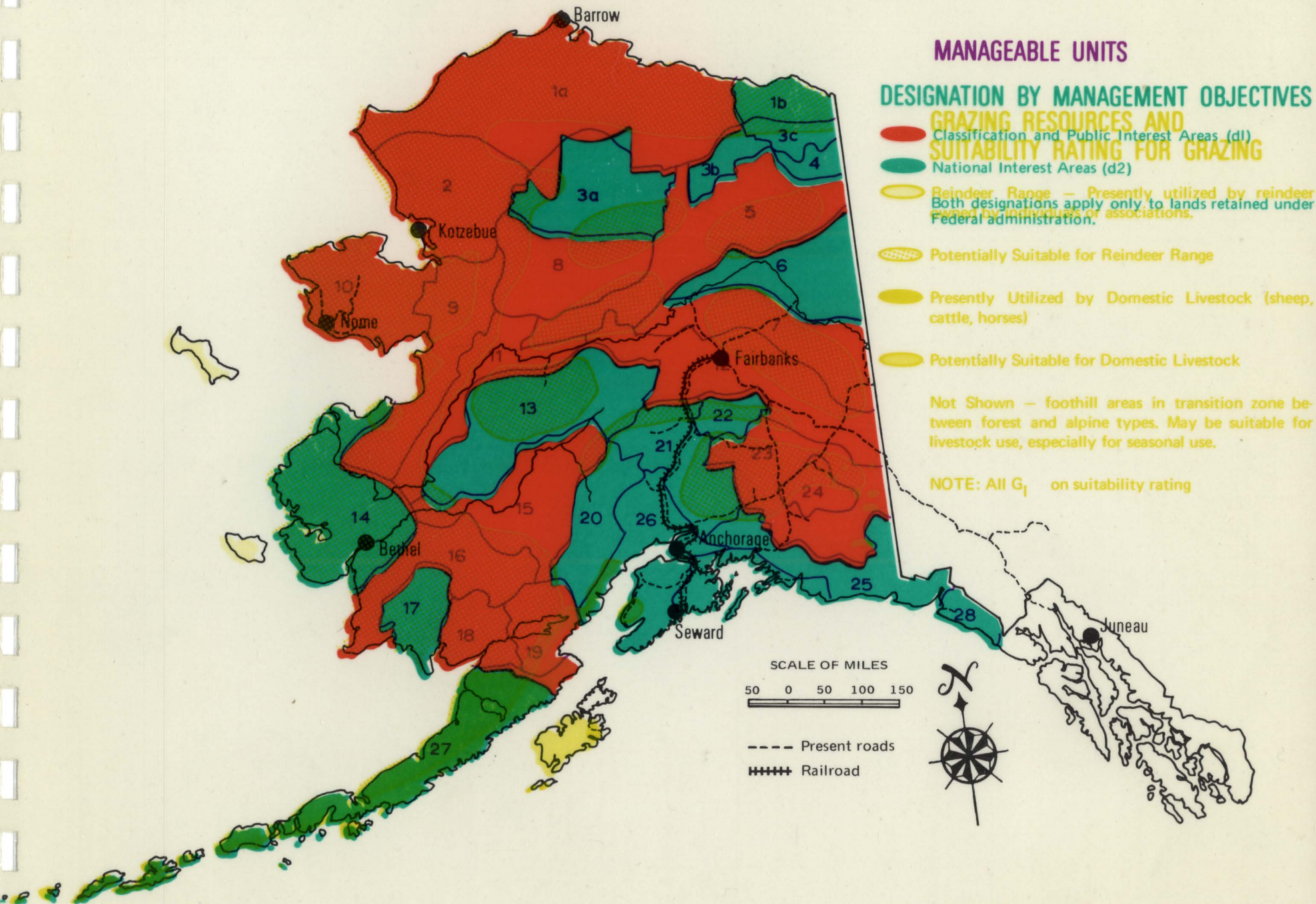
To coordinate the resource management opportunities and management philosophies identified or implied by the study, the Bureau of Land Management recommends that the "d(2)" lands within the multiple use recommendation areas, with the exception of the Wild and Scenic Rivers System lands, be changed to the "d(1)" classification; and the "d(1)" lands outside the multiple use recommendation areas be changed to "d(2)" classification. The Bureau also recommends a four-mile-wide withdrawal of the potentially identified Wild and Scenic Rivers within the multiple use recommendation areas.

Finally, in order to preserve and maintain the outstanding natural resource values and to manage and utilize the lands and other resources under a comprehensive, balanced, and coordinated plan, the Bureau of Land Management recommends the following seven manageable units, 2, 7, 12, 18, 19, 23, and 24, be grouped to establish four National Conservation Areas through legislative enactment.





The four proposed National Conservation Areas (NCA) involve the combination of manageable units 23 and 24 to form the Wrangell Mountains NCA; units 18 and 19 to form the Iliamna NCA; units 7 and 12 to form the White Mountains/Fortymile NCA; and unit 2 to form the Noatak NCA.

The proposed National Conservation Areas are to be administered by the Secretary through the Bureau of Land Management under a program of multiple use for sustained yield, environmental protection for any combination of uses, and management of unique or critical areas to preserve and maintain the existing natural environment. An example of such a multiple use planning process is demonstrated by the Bureau of Land Management's publication covering the Chitina Valley study area (see Appendix A for copy of this document).

All four of the proposed NCAs are shown on the maps numbered 100, 101, 102, and 103 included in this section.

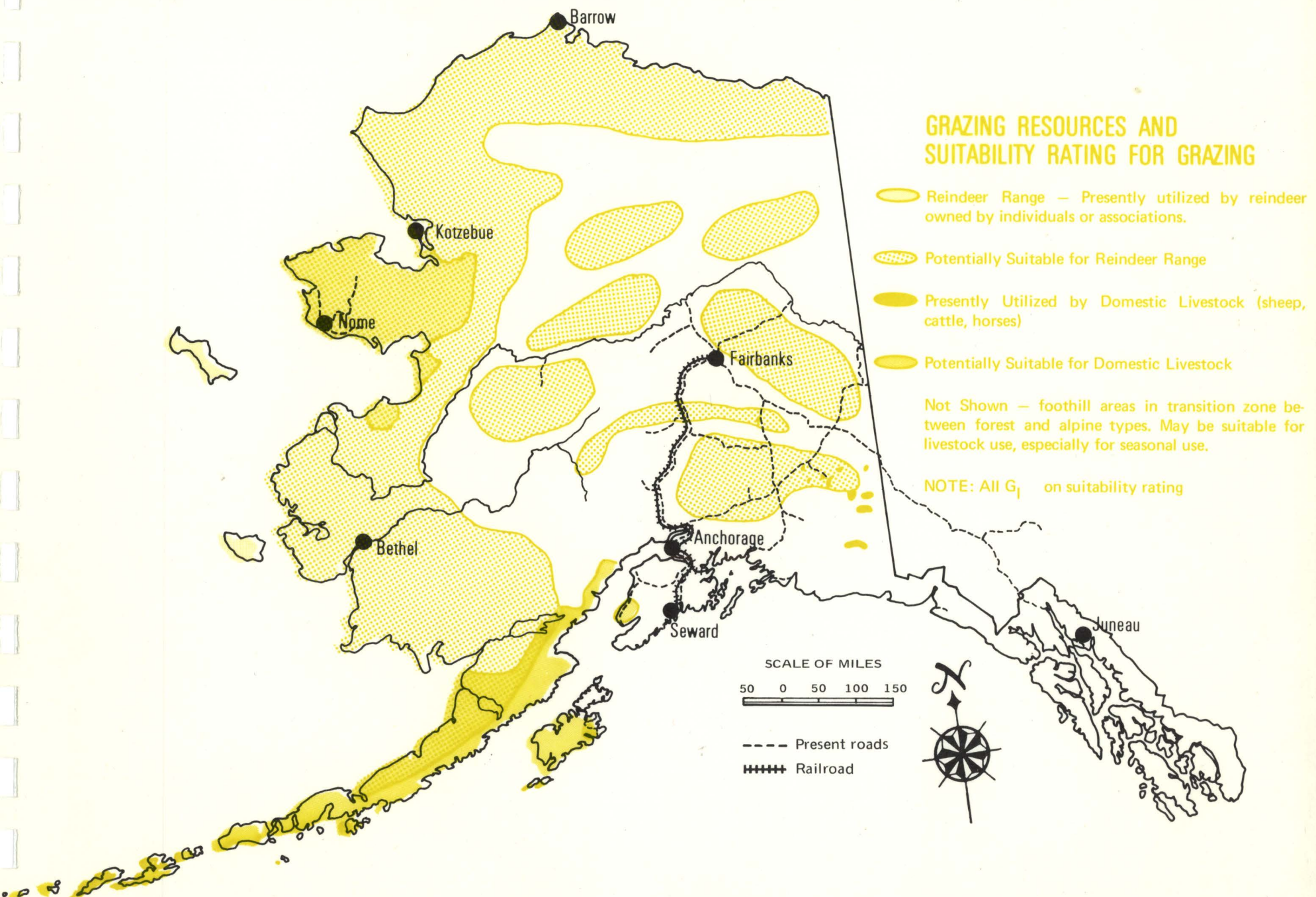


GRAZING RESOURCES AND SUITABILITY RATING FOR GRAZING

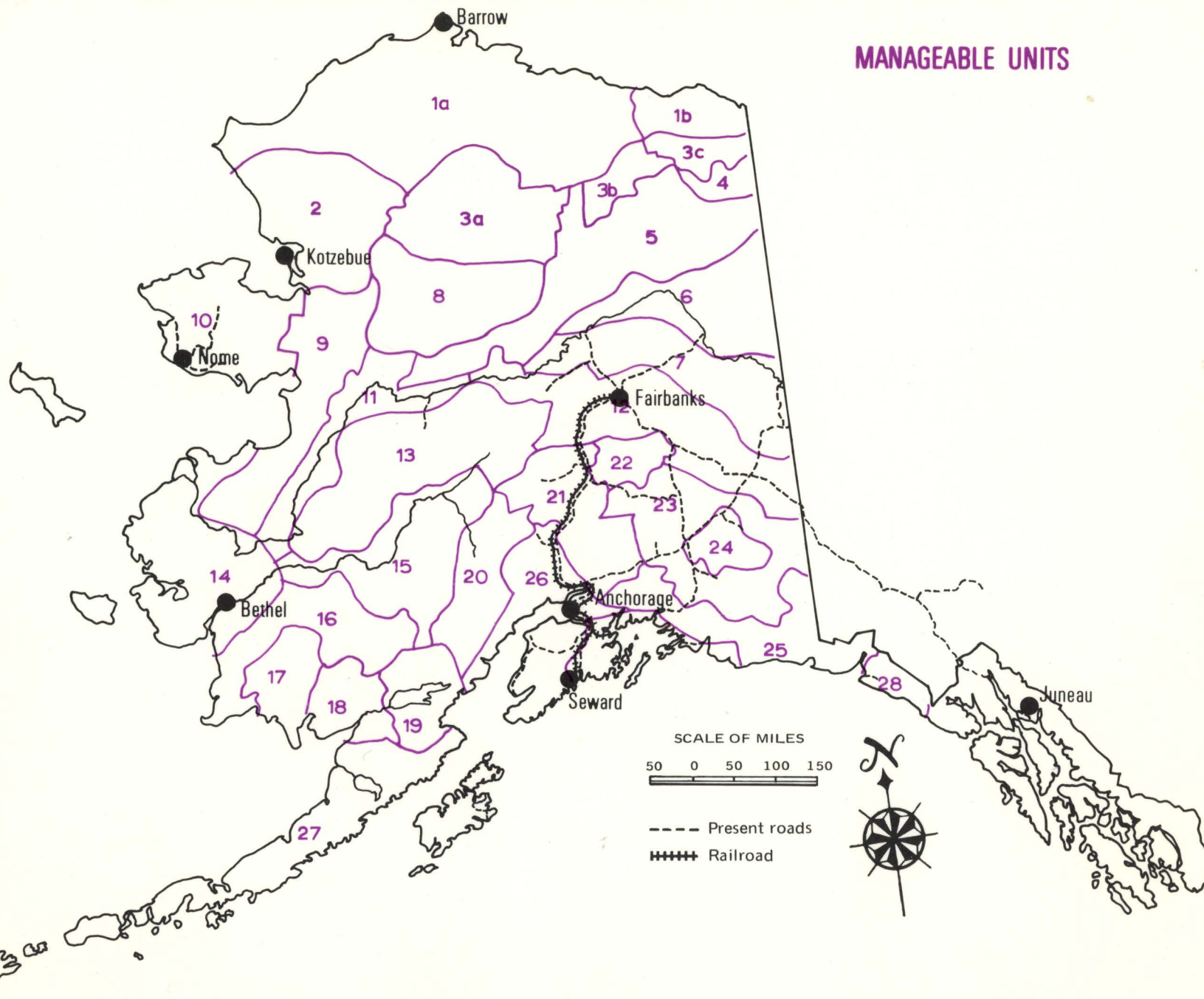
-  Reindeer Range — Presently utilized by reindeer owned by individuals or associations.
-  Potentially Suitable for Reindeer Range
-  Presently Utilized by Domestic Livestock (sheep, cattle, horses)
-  Potentially Suitable for Domestic Livestock

Not Shown — foothill areas in transition zone between forest and alpine types. May be suitable for livestock use, especially for seasonal use.

NOTE: All G_1 on suitability rating



MANAGEABLE UNITS

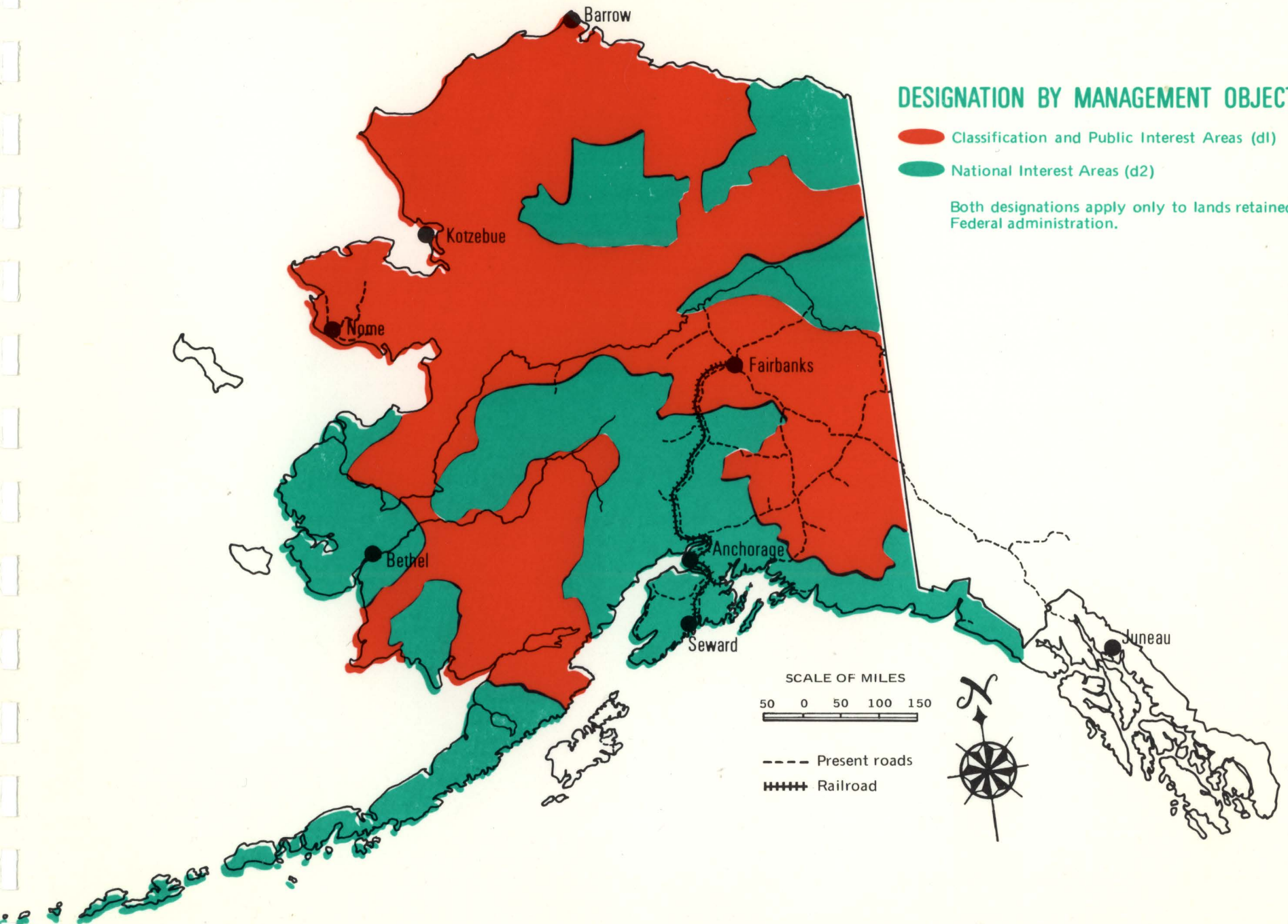


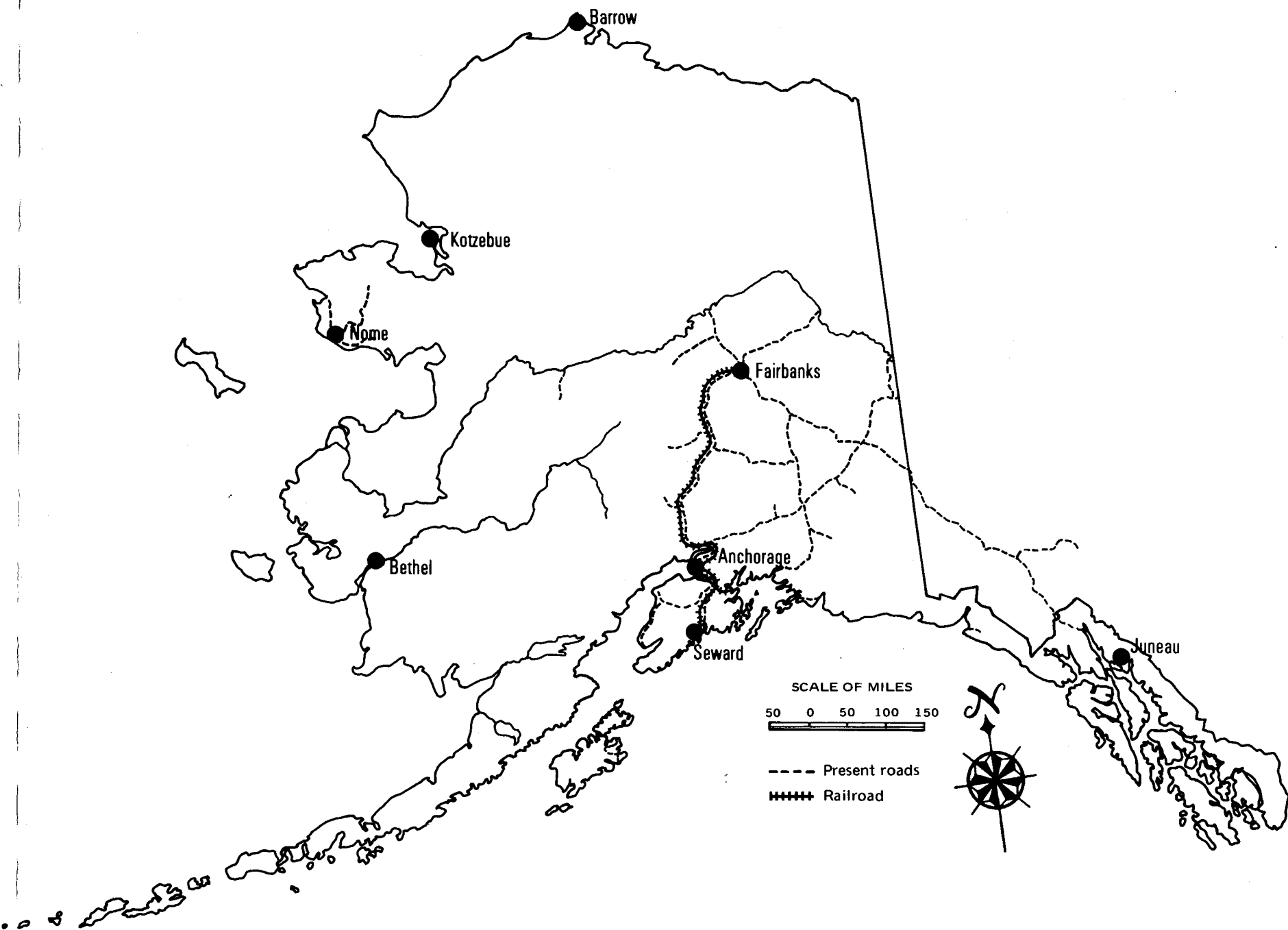
DESIGNATION BY MANAGEMENT OBJECTIVES

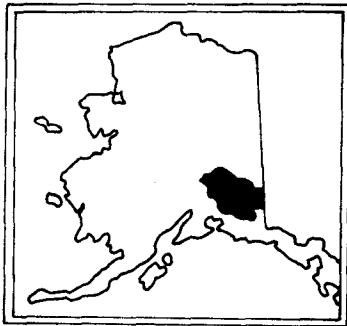
 Classification and Public Interest Areas (d1)

 National Interest Areas (d2)

Both designations apply only to lands retained under Federal administration.





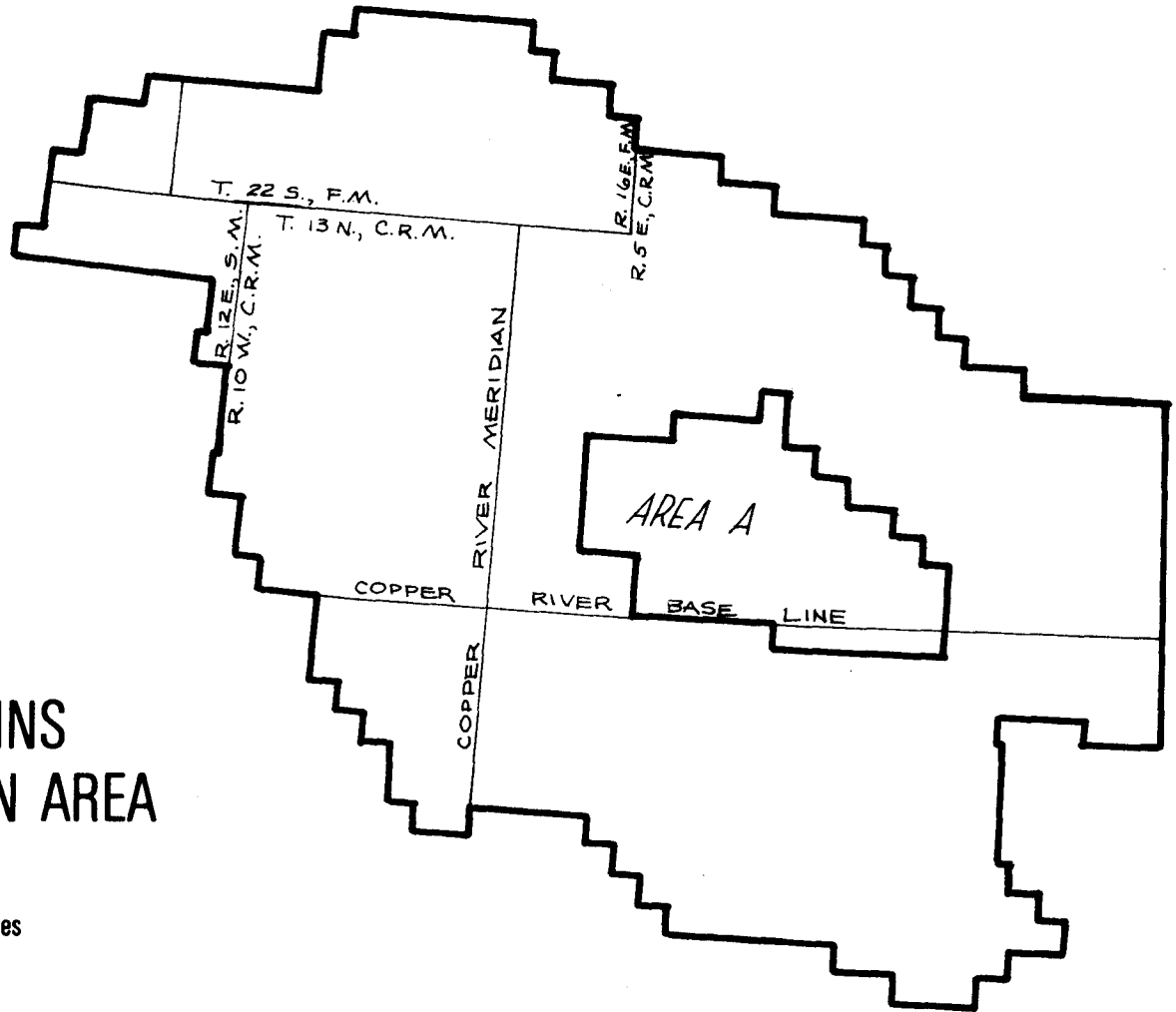


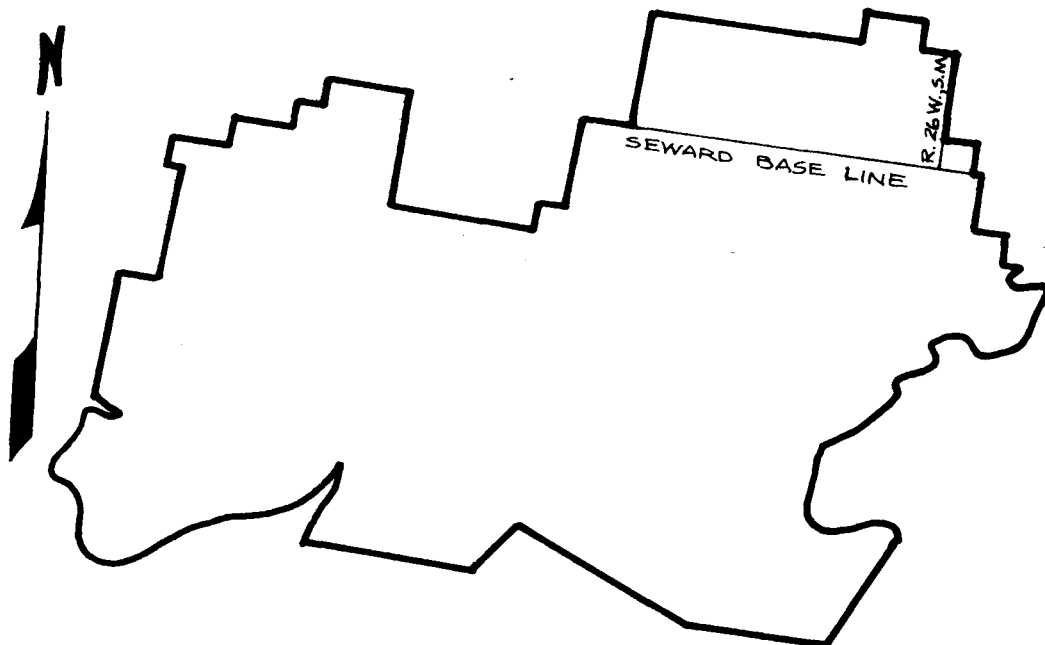
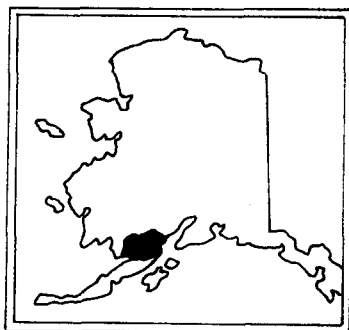
MAP NO. 100

MAY 11, 1973

WRANGELL MOUNTAINS NATIONAL CONSERVATION AREA

one inch equals approximately forty miles



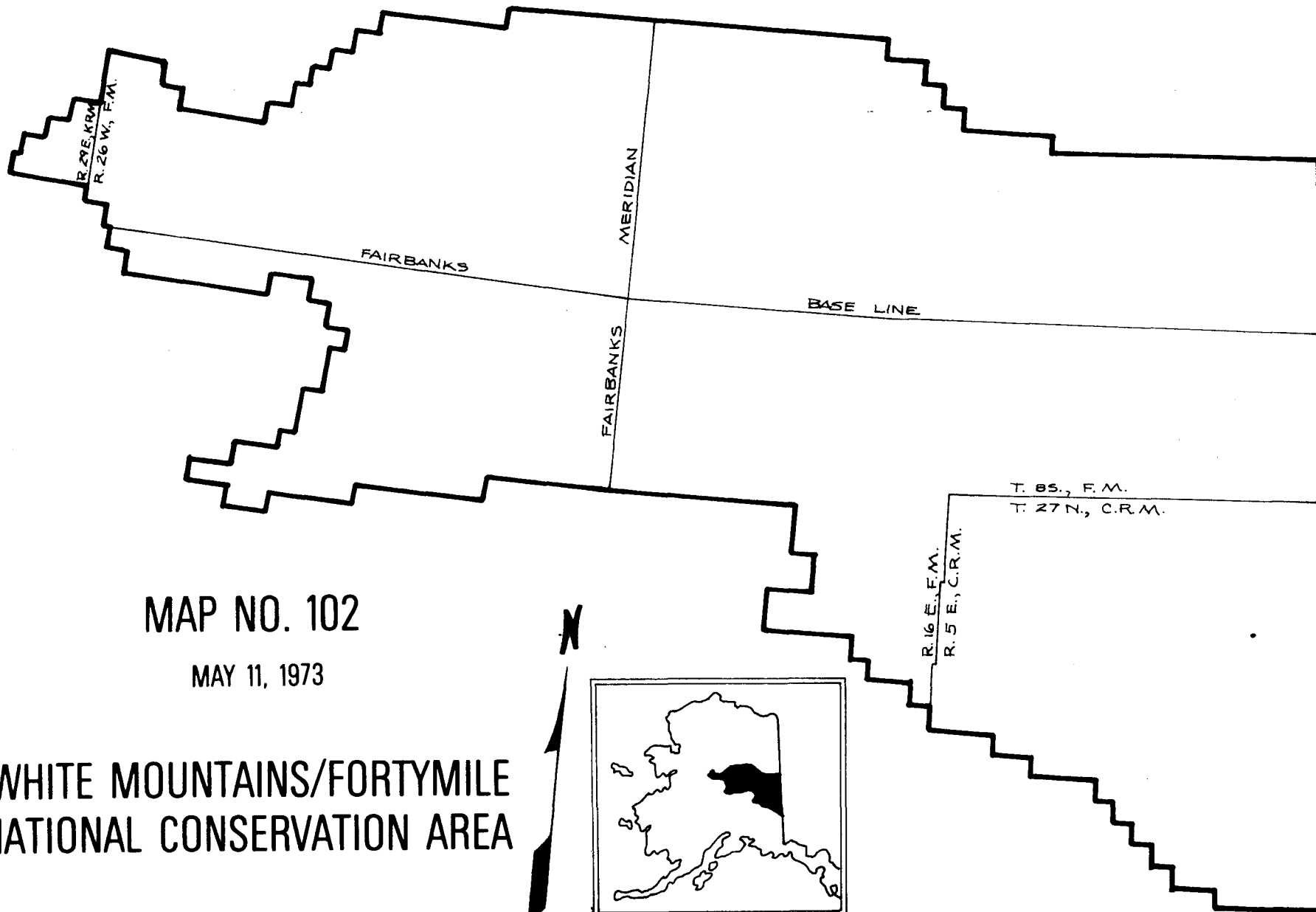


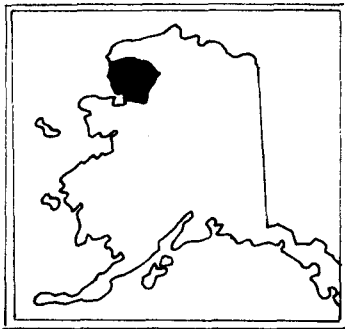
MAP NO. 101

MAY 11, 1973

ILIAMNA NATIONAL CONSERVATION AREA

one inch equals approximately forty miles



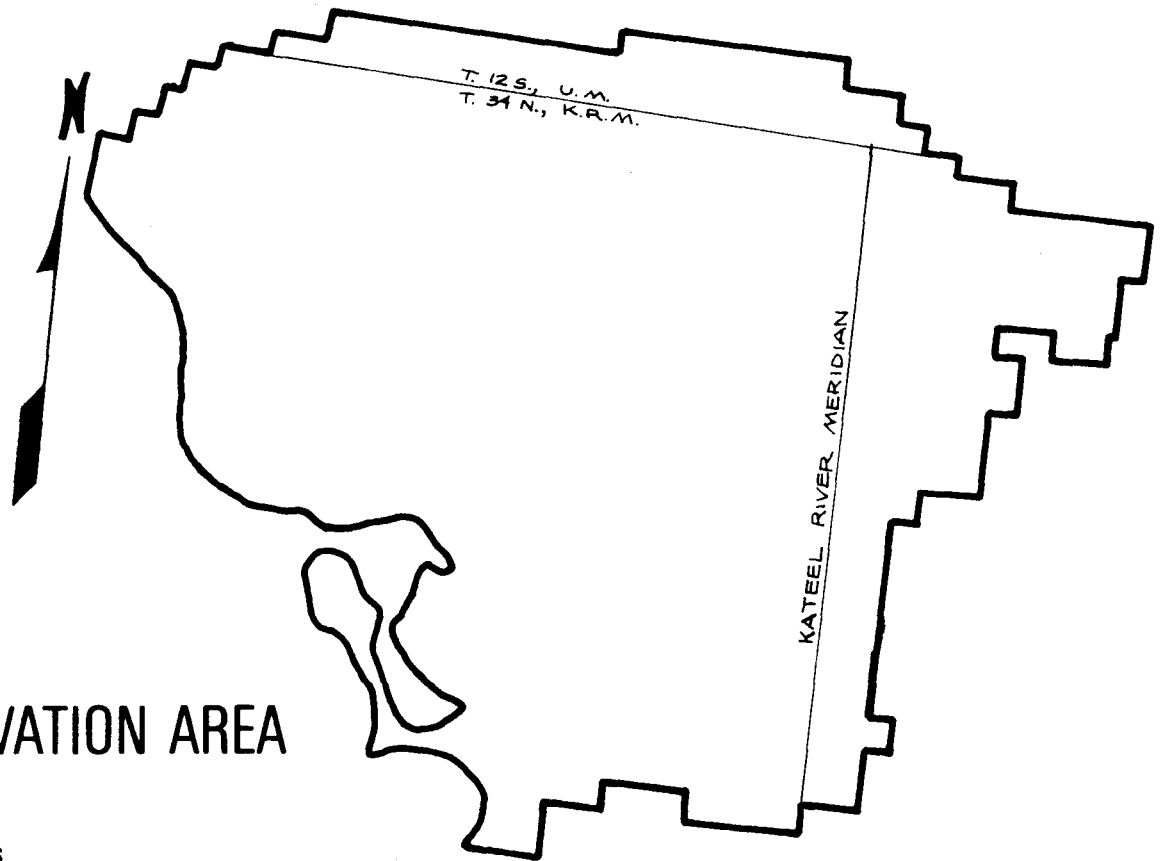


MAP NO. 103

MAY 11, 1973

NOATAK NATIONAL CONSERVATION AREA

one inch equals approximately forty miles



THE STUDY

Introduction

Purpose. At its origin, the general purpose of this study was to provide a basis for identifying the areas to be retained in the Federal ownership under management of the Bureau of Land Management.

Objective. The objective was to identify and define the resource management opportunities and manageable areas or units for determination of land management policies under the Alaska Native Claims Settlement Act.

Scope. In an attempt to present a case, the study provides (1) a broad ecologically oriented assessment of the land base, with the exception of the southeastern region; (2) an identification of areas and grouping of areas where, based on the capacity of land, either limited use or multiple use management should prevail; (3) a regional analysis showing growth potentials and lagging regions, and (4) an economic supplement which discusses high economic development potentials for four specific areas of Bureau of Land Management interest.

Methodology. The study, as developed, is not a management plan by itself. It is, however, an inductively developed informational framework for the decision-makers which provides or broadly translates the resource use or development capacity of the land base for man's uses.

The process features a map overlay system or the map transparency and sieve technique for much of the analytical work. The results of the map analysis are limited or are as good as the informational work maps developed on the Series E Maps of Alaska, where one inch on the scale is approximately 40 miles.

The analytical process consisted of the following steps:

- . Ecologically oriented assessment of the land base.
- . Identification of manageable units and resource management opportunities.
- . Regional analysis.
- . Economic supplement.

The Analysis

Ecologically Oriented Assessment

This part is the mainstay of the analytical process as it sets the inductive pattern for interpreting the physical and biological resource information in a given area into a meaningful context--a first level broad indicator of the capacity for the resources and land base to support man's uses or intrusion.

What was done here was to bring together an array of physical and biological information on Alaska, and translate the information into work overlay maps adaptable to the transparency and sieve techniques of analysis. The information was collected by the Bureau of Land Management throughout the years from inhouse and other agencies' studies.

The following is a chronological discussion on the translation process, map interpretations, analysis, and some illustrations on the array of maps developed for the study on the Alaska Series E map scale. The analysis is featured by an overlay series of physical and biological information maps, resource inventory maps, and a series of ecologically oriented land use suitability maps.

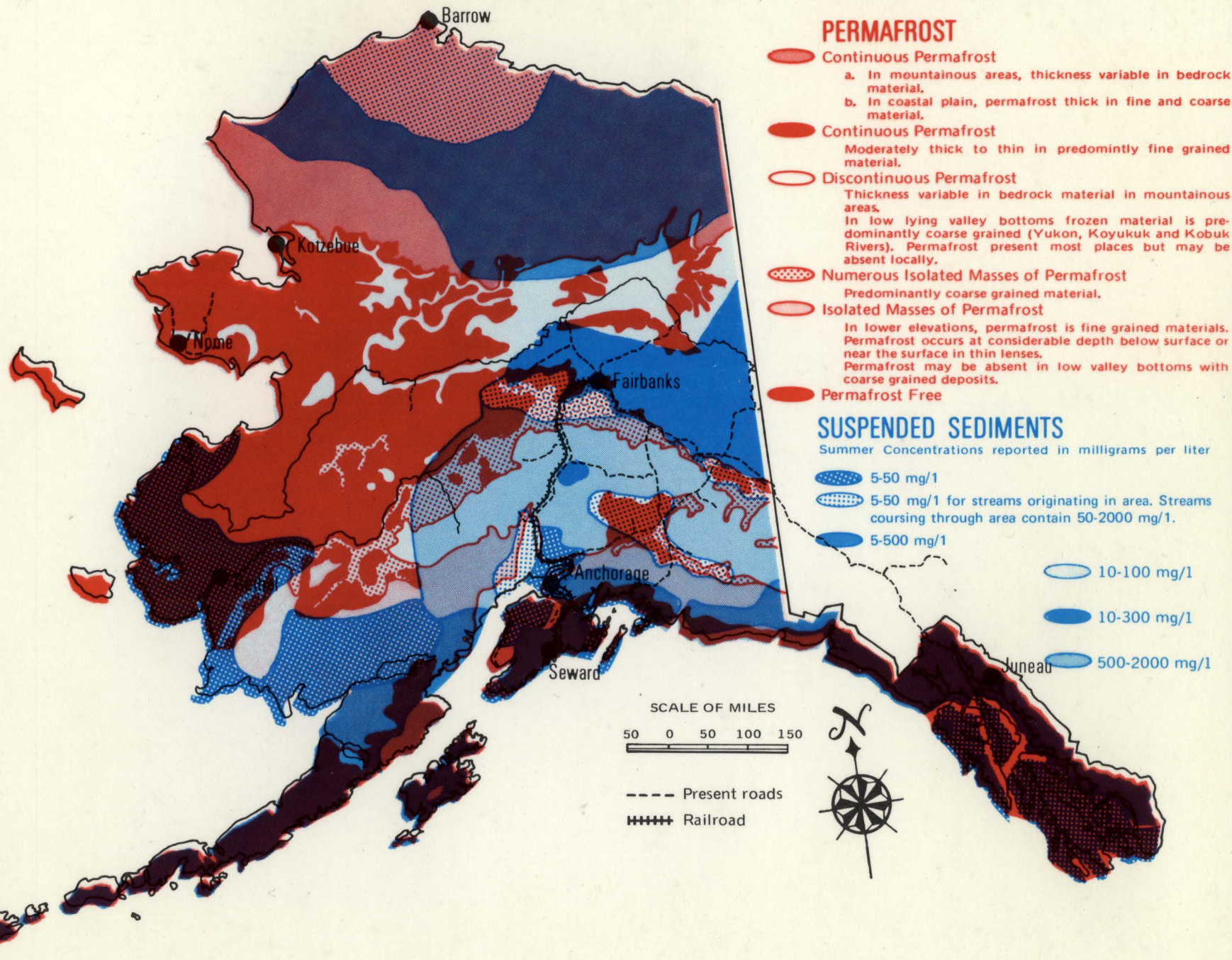
Physical Profile

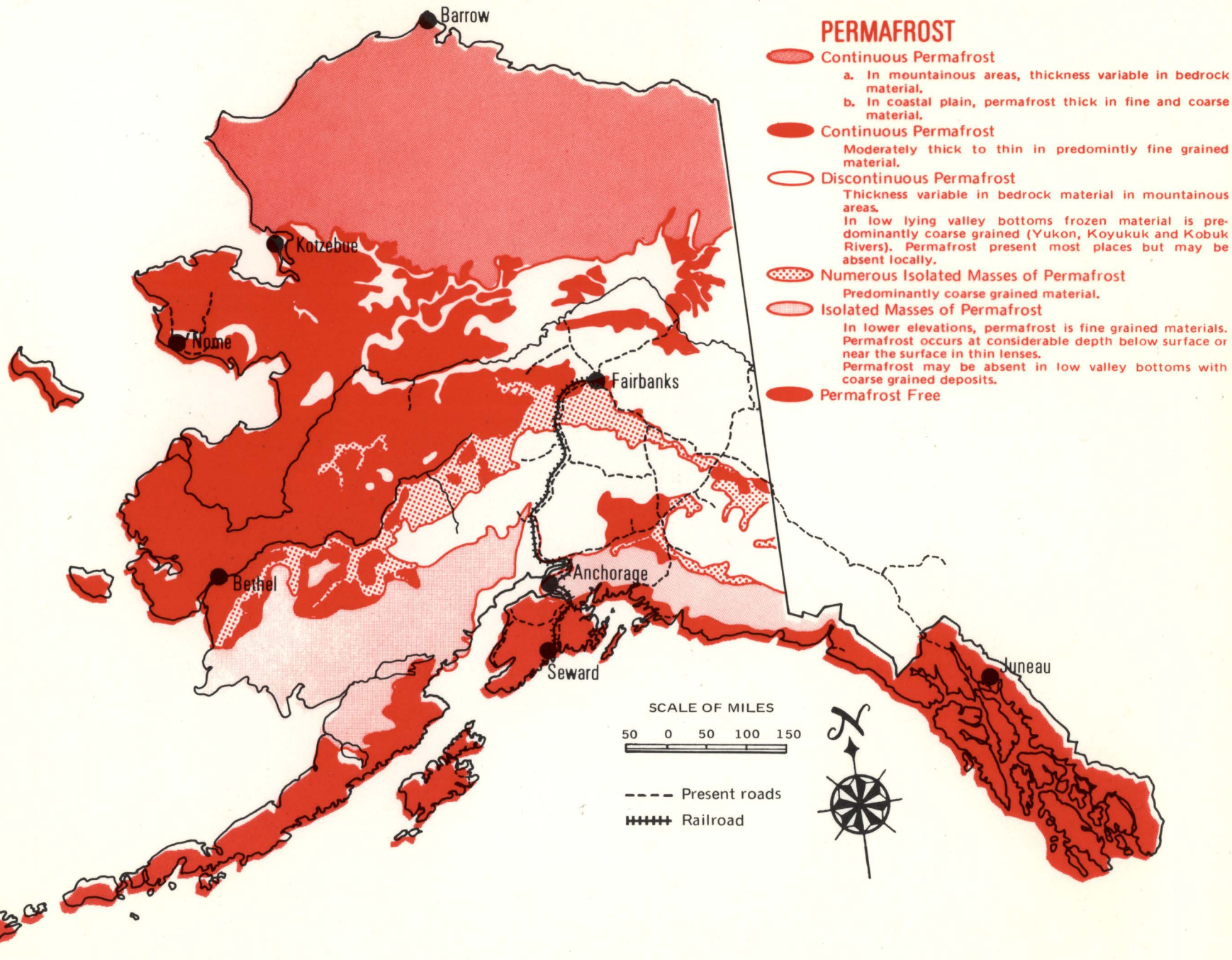
This part involves an inventory and interpretive process of the subsystems of the natural environment. The process culminates with the transferral into work map forms some of the dimensions and attributes identified with the subsystems which, together with man's physical presence, serve as determinants of use capacity.

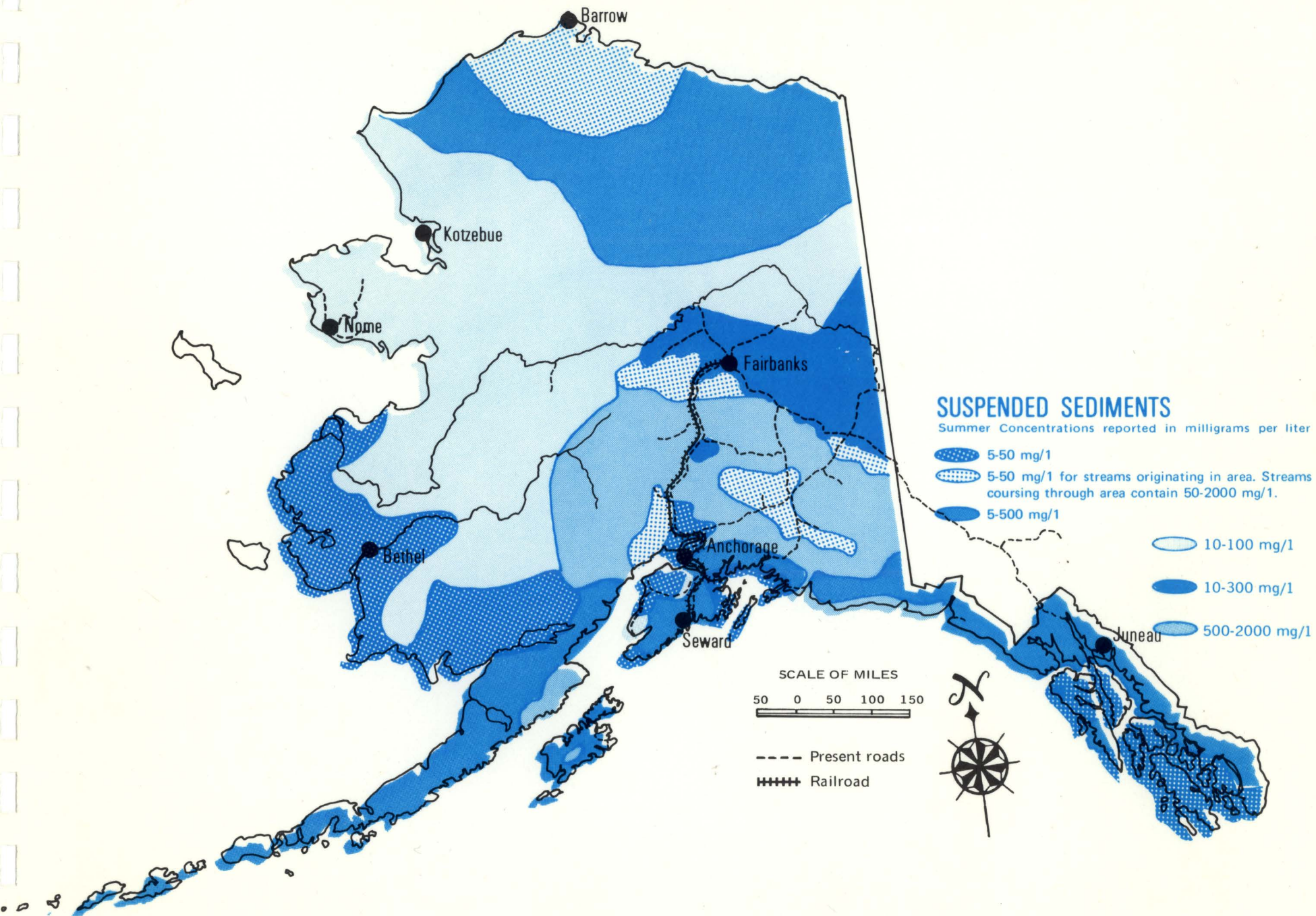
The subsystems and some of the determinants considered in this study, but not necessarily portrayed in the map transparency series, included the following:

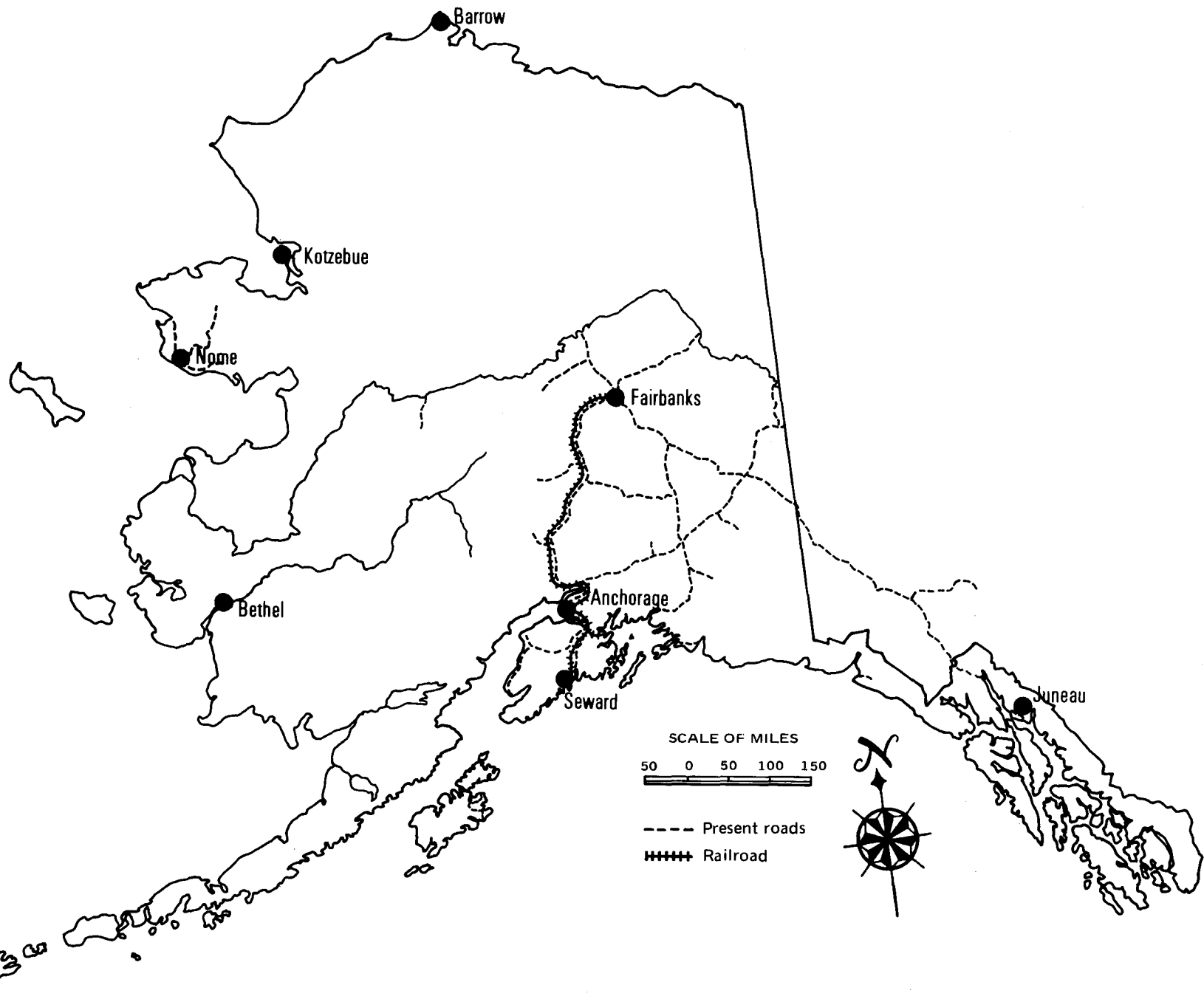
<u>Subsystems</u>		<u>Determinants</u>
Geology	-	<ul style="list-style-type: none"> . Surficial characteristics . Permafrost characteristics . Fault lines and seismic zones
Soils	-	<ul style="list-style-type: none"> . Soil characteristics . Suitability ratings for road and airfield construction
Topography	-	<ul style="list-style-type: none"> . Physiographic regions
Water regimen	-	<ul style="list-style-type: none"> . Watersheds . Water sediment load . Ground water potentials . Water bodies and wetlands . Potential flood, ice jam, tsunami and wave hazard areas
Vegetation	-	<ul style="list-style-type: none"> . Vegetation types

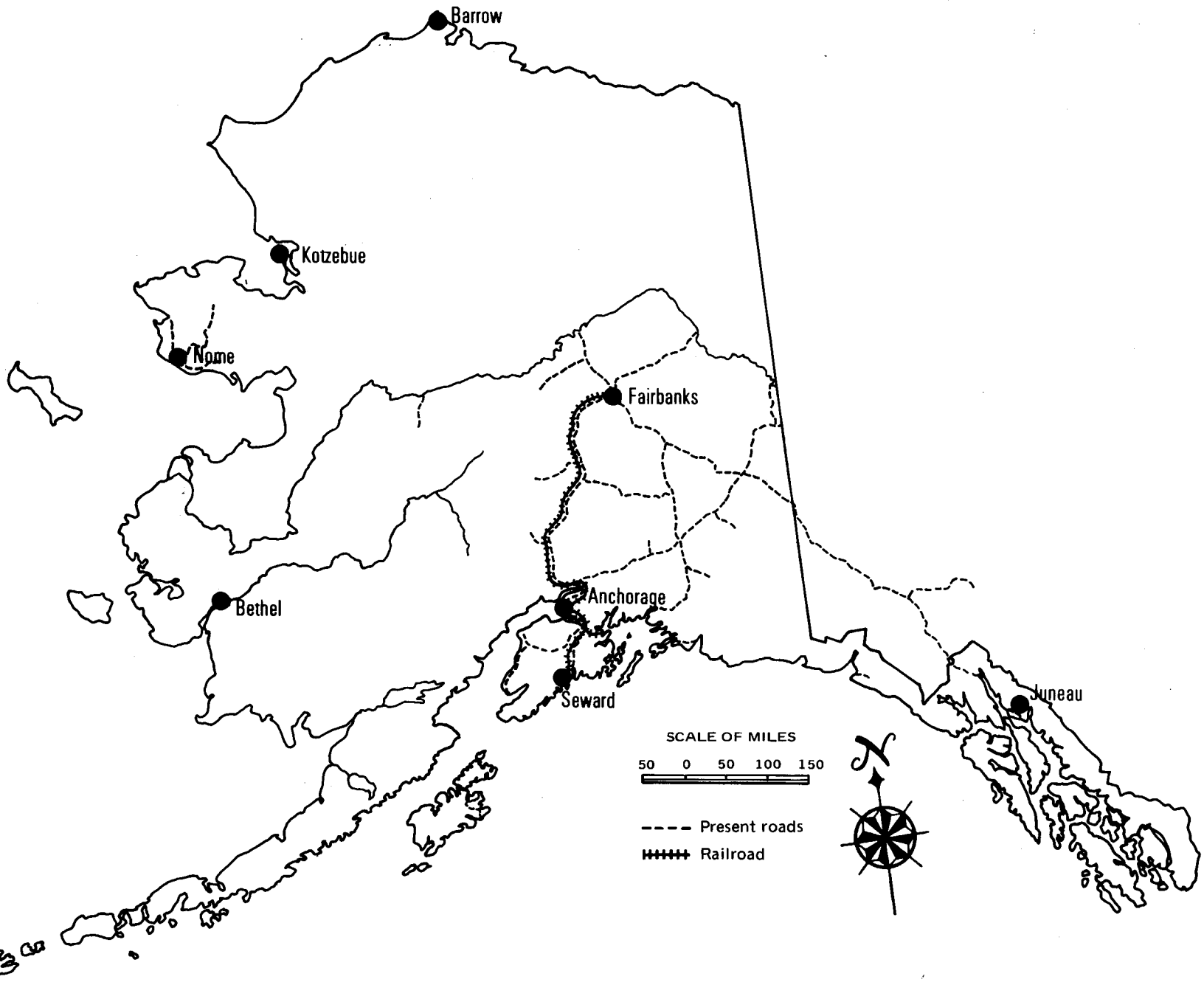
Two examples of how these determinants were portrayed are shown in this section on the illustrated reduction maps for Permafrost and Sediment Load.











Resource Profile





This section is also a part of the inventory process. It is essentially a straightforward development of Alaska's resource inventory on transparency map format. The resource profiles were compiled from available information, from both internal and external sources. Those developed in transparency map format for this study are listed below:

- Timber Inventory
- Lands Status - existing and potential use patterns
- Locatable Minerals
- Possible Metalliferous Provinces
- Coal-Bearing Rocks
- Possible Oil and Gas Provinces
- Big Game Wildlife Habitat
- Waterfowl and Fish Habitat
- Recreation--Wild and Scenic Rivers
 - Primitive and Scenic
 - Cultural Features
 - Nodal Patterns and Influence Zones
 - Soil and Permafrost Limitation
 - Hazards

Examples of how some of this inventory information was portrayed are shown on the illustrated reduction of the resources profile maps for Livestock Forage (Grazing), Minerals (Possible Metalliferous Provinces, Distribution of Coal-Bearing Rocks, Possible Petroleum Provinces), Timber, Wildlife Habitat (Big Game Species and Waterfowl and Fish). These illustration maps are included in this section.



POSSIBLE PETROLEUM PROVINCES

POSSIBLE METALLIFEROUS PROVINCES





-  Includes areas with currently producing mines, once producing deposits with remaining resources and deposits with high development potential.
-  Includes areas of known mineral occurrences and areas of high metal resource, potential based on geologic settings, and geochemical and geophysical data.
-  Includes areas adjacent to and geologically similar to category II. Considered favorable for metal resources.
-  Includes areas of low or unknown metal resource potential.

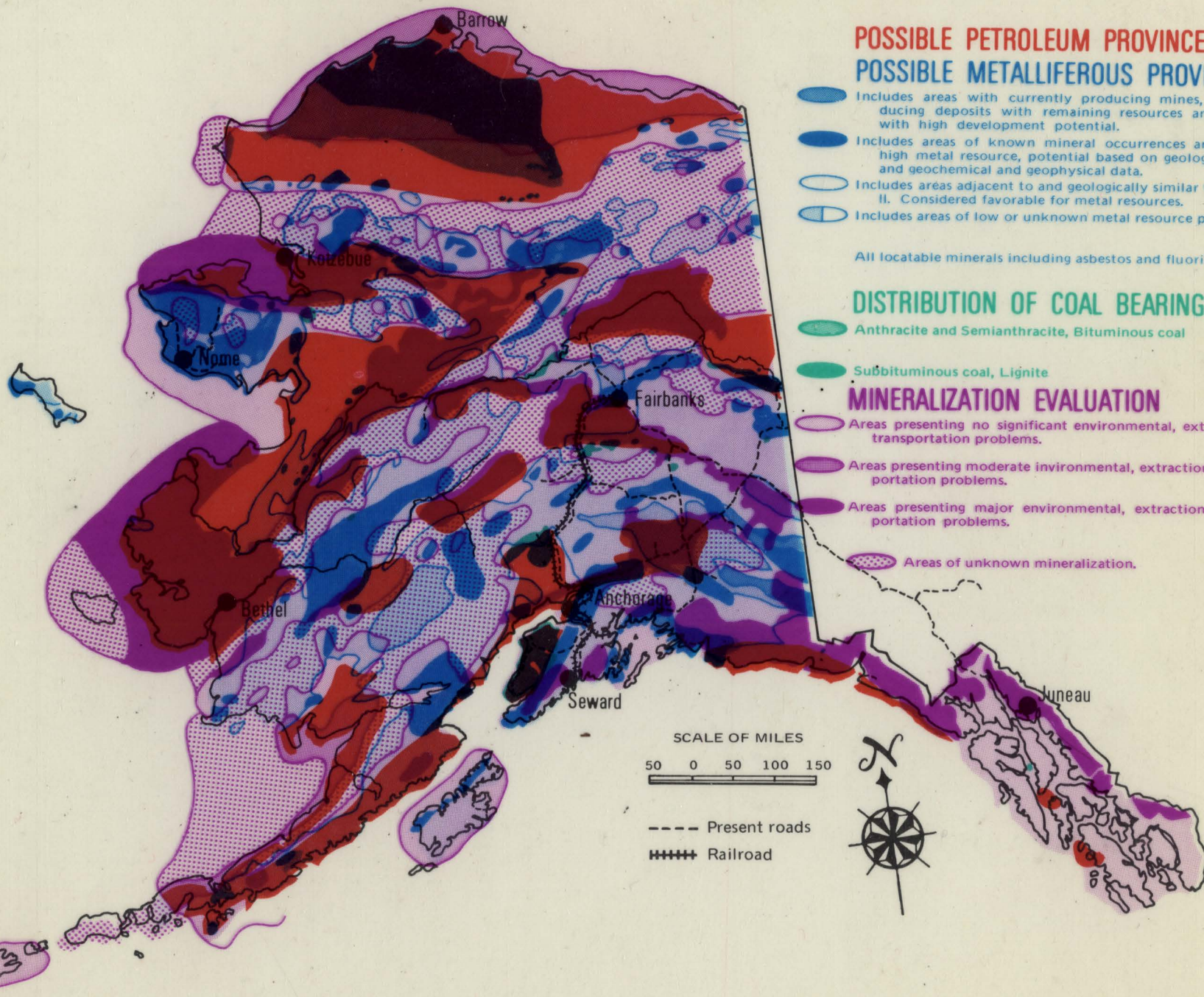
All locatable minerals including asbestos and fluorite.

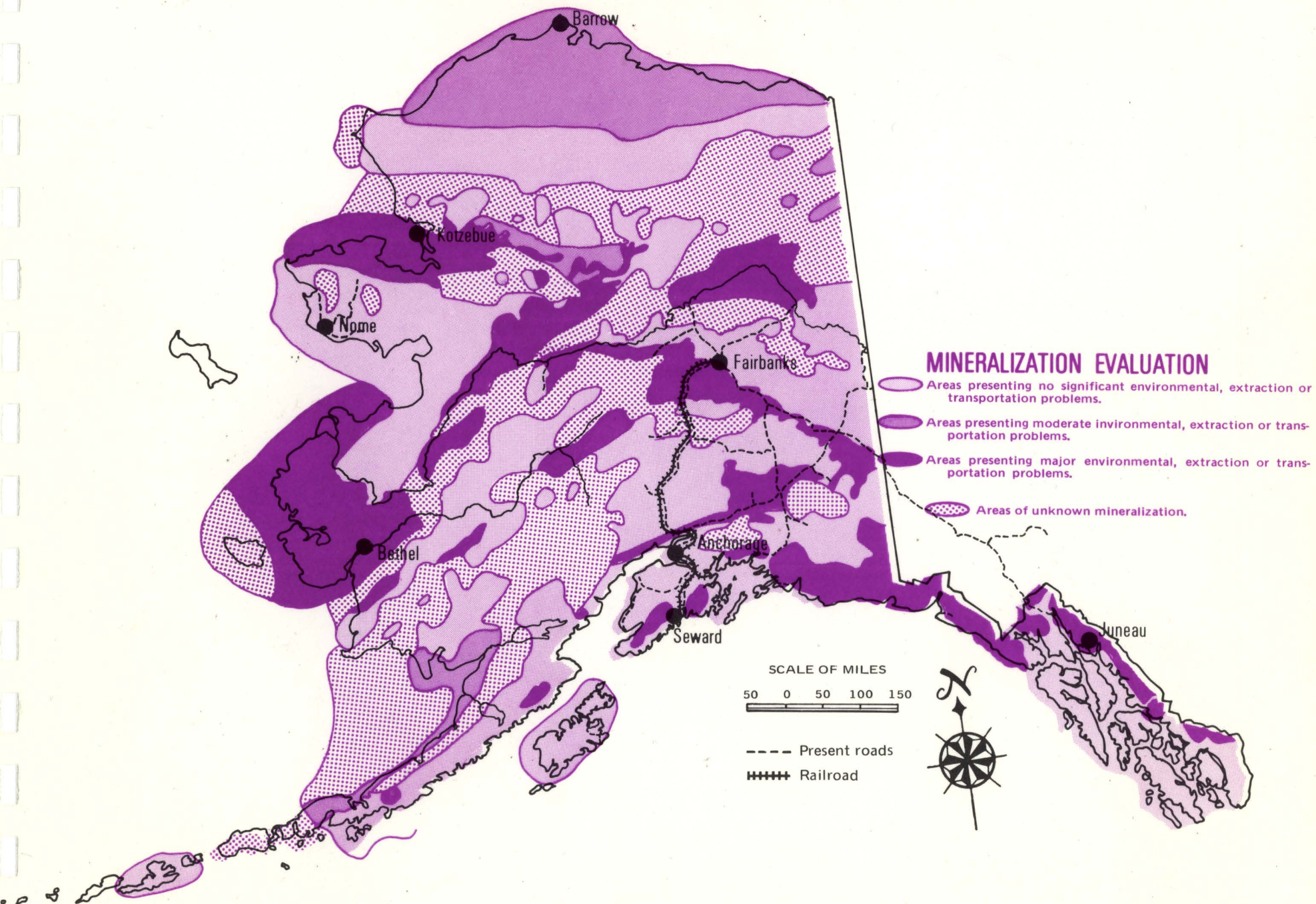
DISTRIBUTION OF COAL BEARING ROCKS

-  Anthracite and Semianthracite, Bituminous coal
-  Subbituminous coal, Lignite

MINERALIZATION EVALUATION

-  Areas presenting no significant environmental, extraction or transportation problems.
-  Areas presenting moderate environmental, extraction or transportation problems.
-  Areas presenting major environmental, extraction or transportation problems.
-  Areas of unknown mineralization.





MINERALIZATION EVALUATION





- Areas presenting no significant environmental, extraction or transportation problems.
- Areas presenting moderate environmental, extraction or transportation problems.
- Areas presenting major environmental, extraction or transportation problems.
- Areas of unknown mineralization.

SCALE OF MILES
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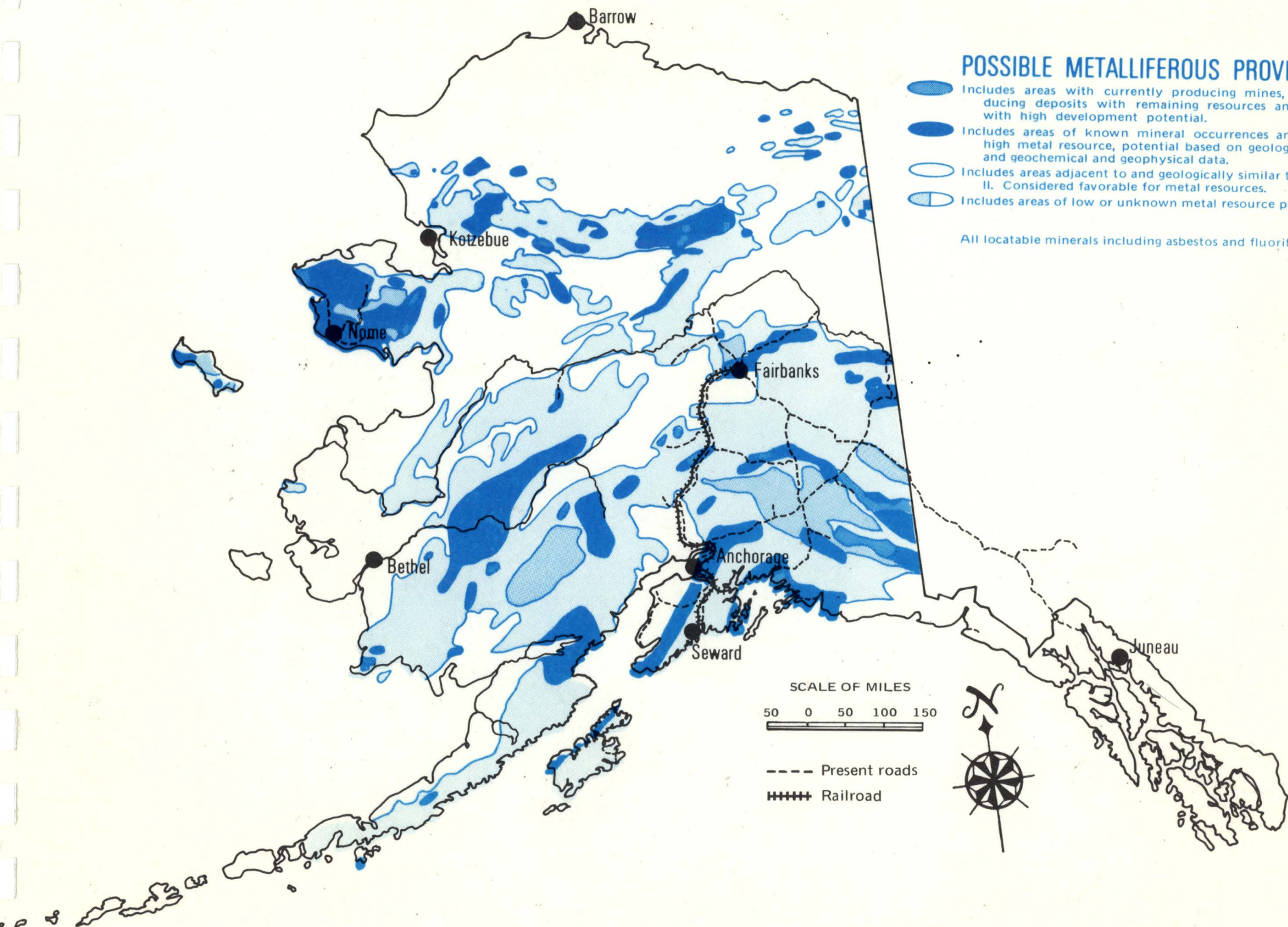
--- Present roads
++++ Railroad

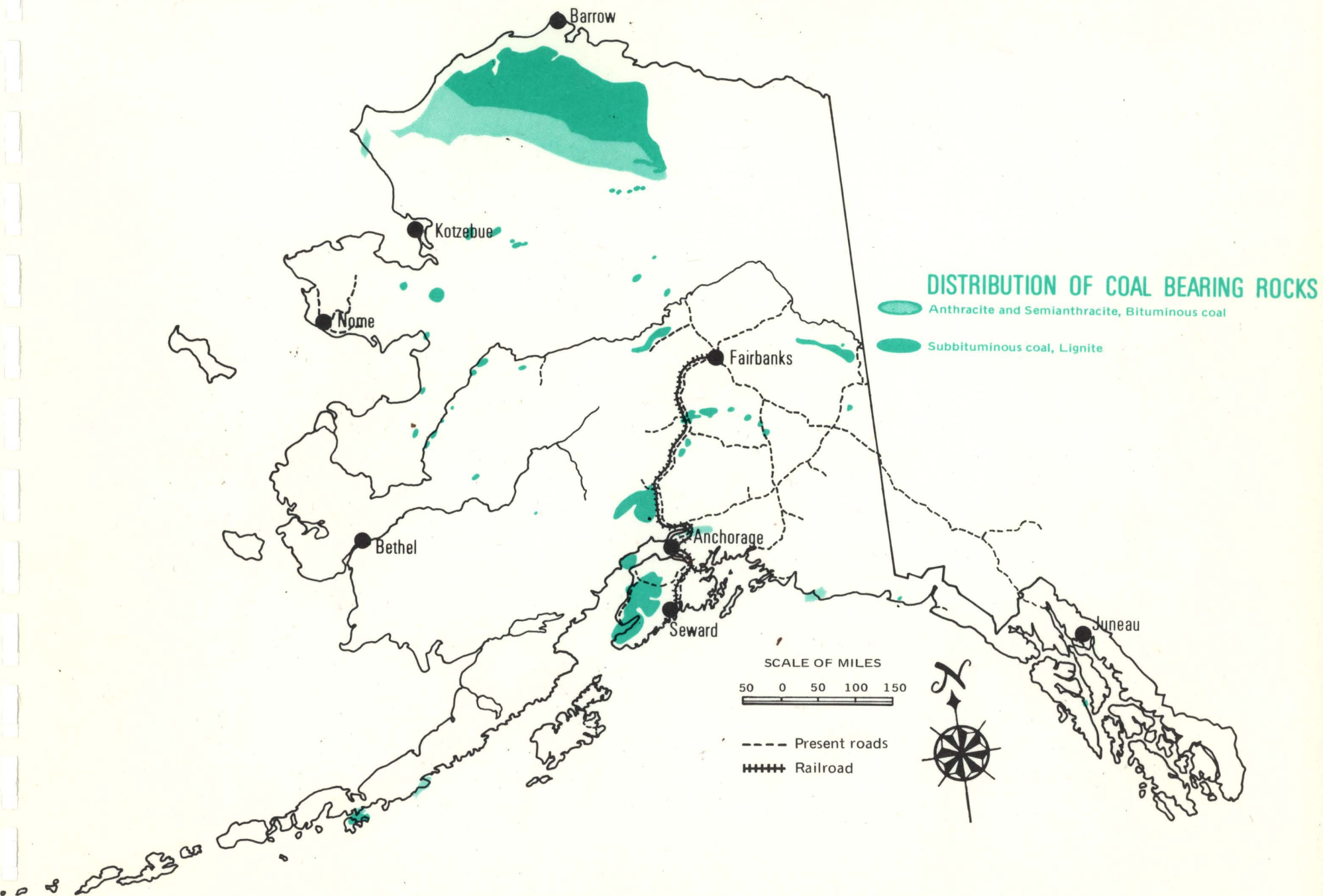


POSSIBLE METALLIFEROUS PROVINCES

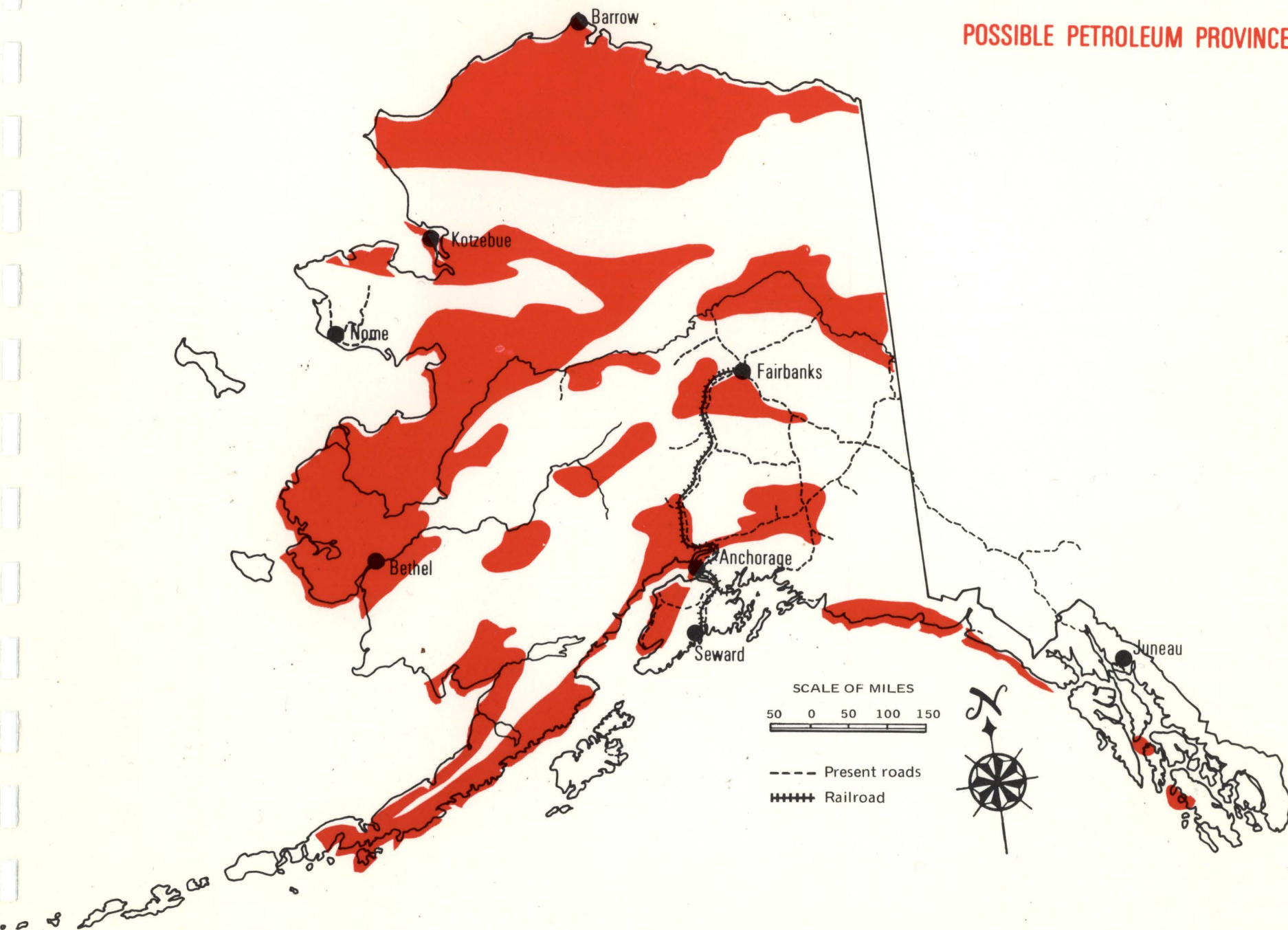
-  Includes areas with currently producing mines, once producing deposits with remaining resources and deposits with high development potential.
-  Includes areas of known mineral occurrences and areas of high metal resource, potential based on geologic settings, and geochemical and geophysical data.
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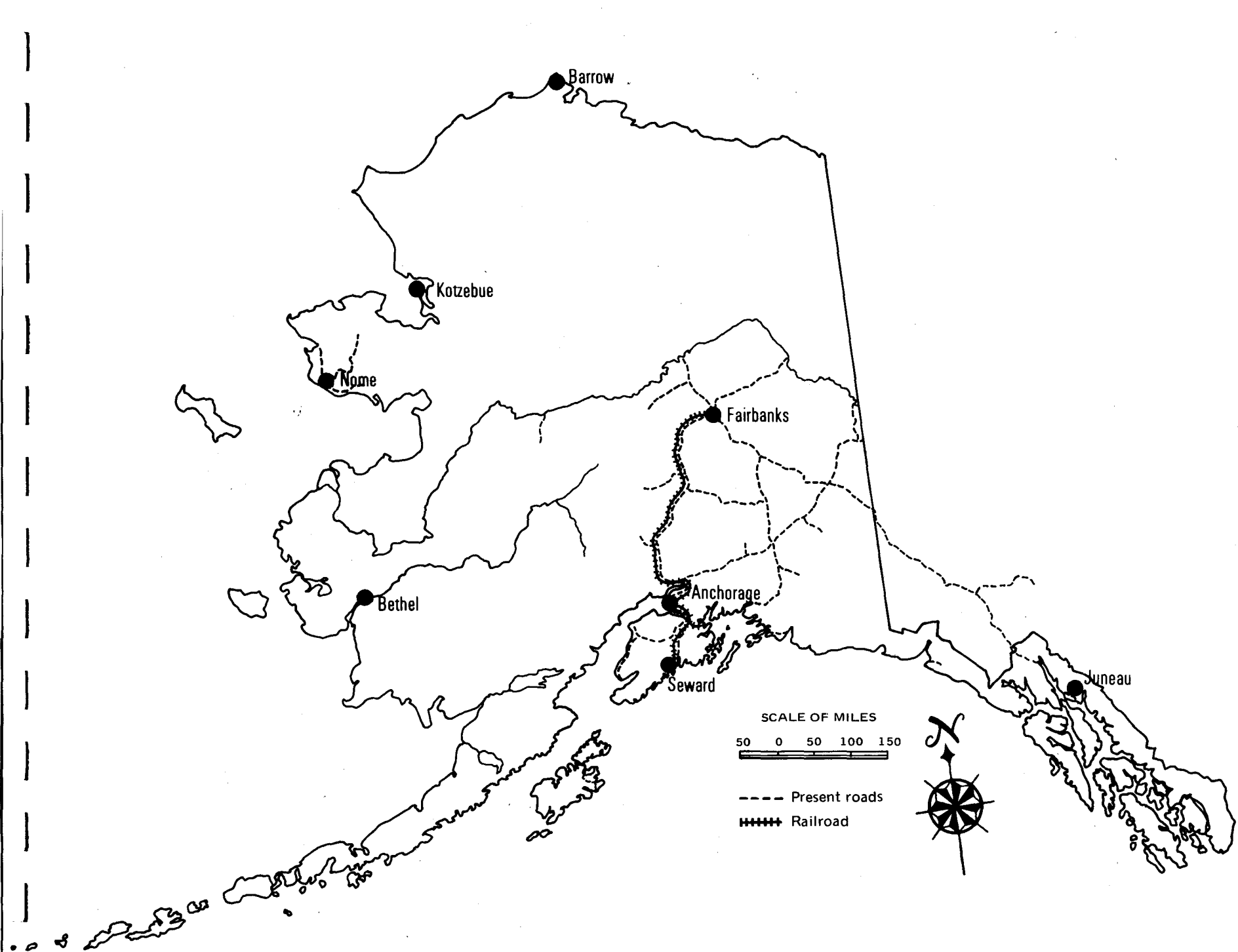
All locatable minerals including asbestos and fluorite.





POSSIBLE PETROLEUM PROVINCES





Use Suitability Evaluations








This process provided the interface or brought together the physical and biological inventory described in the preceding sections for assessment. By relating the applicable physical and biological determinants developed to the inventory information (man's values) for each resource category, it now became possible to provide an ecologically oriented assessment for any given land area with its identified resource value.

Using the map transparency and sieve techniques with the definitions listed below, each of the seven resource disciplines represented in this study developed a suitability rating map covering every land area identified on the resource inventory map. The codified letters and numbers used are defined below:

- G - Livestock Forage
- T - Timber
- L - Lands
- M - Minerals
- W - Water
- H - Wildlife Habitat
- R - Recreation




- 1 - High amenability to environmental modification, or, in the case of water, the number reflects low limitations to use and development of water.
- 2 - Moderate amenability to environmental modifications, or, in the case of water, the number reflects generally some critical limitations for use and development of water.
- 3 - Low amenability to environmental modification, or, in the case of water, the number reflects considerable limitations to use and development of water.

WATERFOWL AND FISH AREAS

-  Waterfowl Concentration and Nesting Areas
-  Cold Water Fish Areas
-  Anadromous Fish Areas
-  Raptor Concentration Areas General
-  Peregrine Falcon
-  Gyr Falcon Habitat
-  ADF&G Study Area

SUITABILITY RATING FOR WILDLIFE HABITAT

Rating of potential impact of human use and development of lands and other resources on wildlife habitat

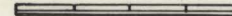
-  Low Potential Impact — generally broad range areas, few identified critical areas. Locally, impact may be high, but of little total influence on most wildlife species.
-  Medium Potential Impact — includes concentration areas of continental waterfowl, shore bird and raptor species. Important for nesting, rearing and feeding. Also includes some concentration areas for resident species such as moose and caribou. Locally, human use impact may be high.
-  High Potential Impact — includes known ranges and concentration areas of rare and endangered species (peregrine falcon, glacier bear), high production areas for anadromous and cold water fisheries, critical caribou calving areas, waterfowl nesting and resting areas, concentration and critical areas for brown/grizzly bear, remnant sheep populations, raptor concentration areas and major caribou migration routes.

WILDLIFE — BIG GAME SPECIES

-  Mountain Goat
-  Moose
-  Dall Sheep
-  Musk-ox
-  Bison
-  Glacier Bear
-  Brown/Grizzly Bear
-  Known Brown/Grizzly Bear Denning Areas
-  Caribou Winter Range
-  Caribou Calving Areas
-  Principal Caribou Migration Routes

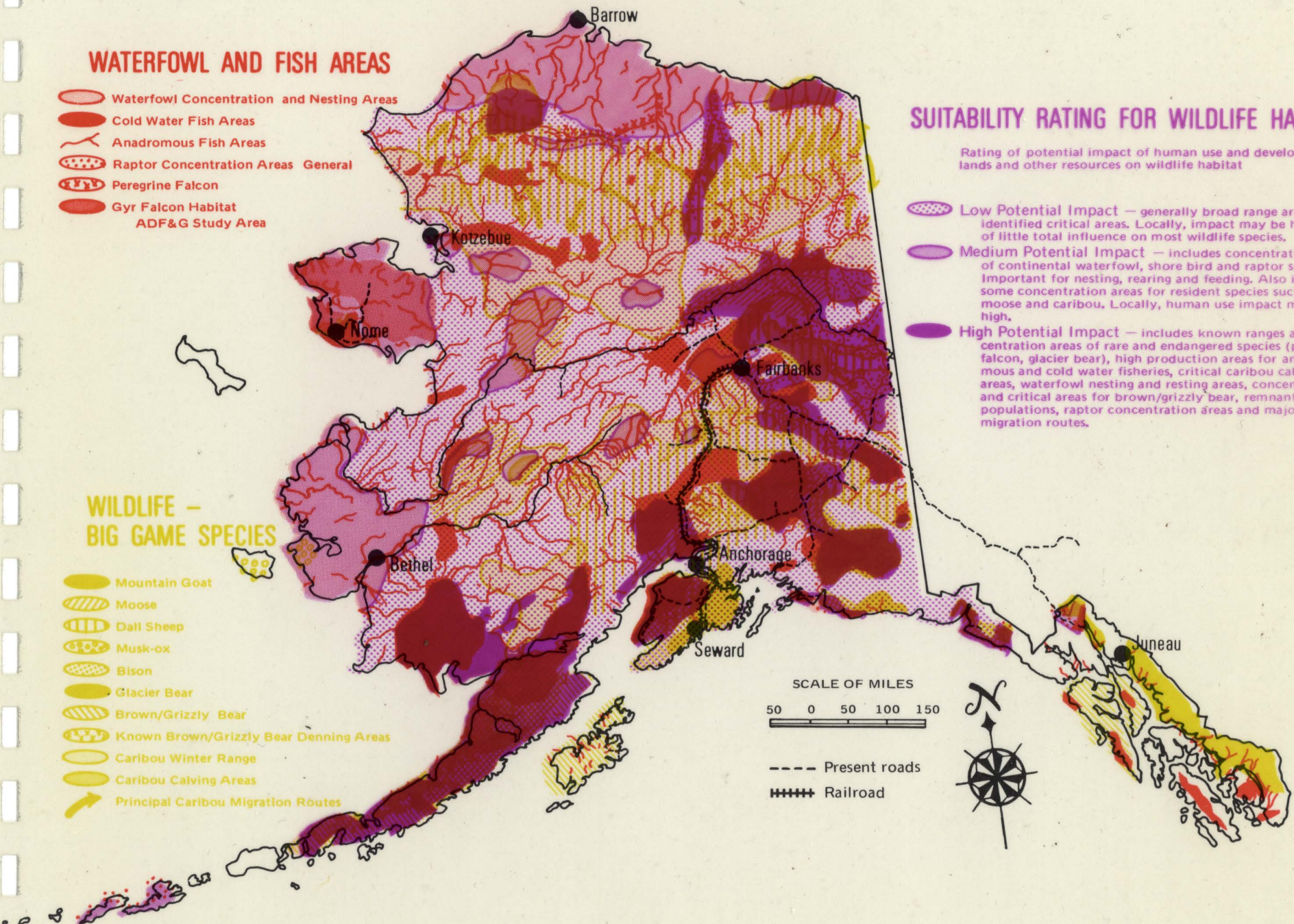
SCALE OF MILES

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--- Present roads

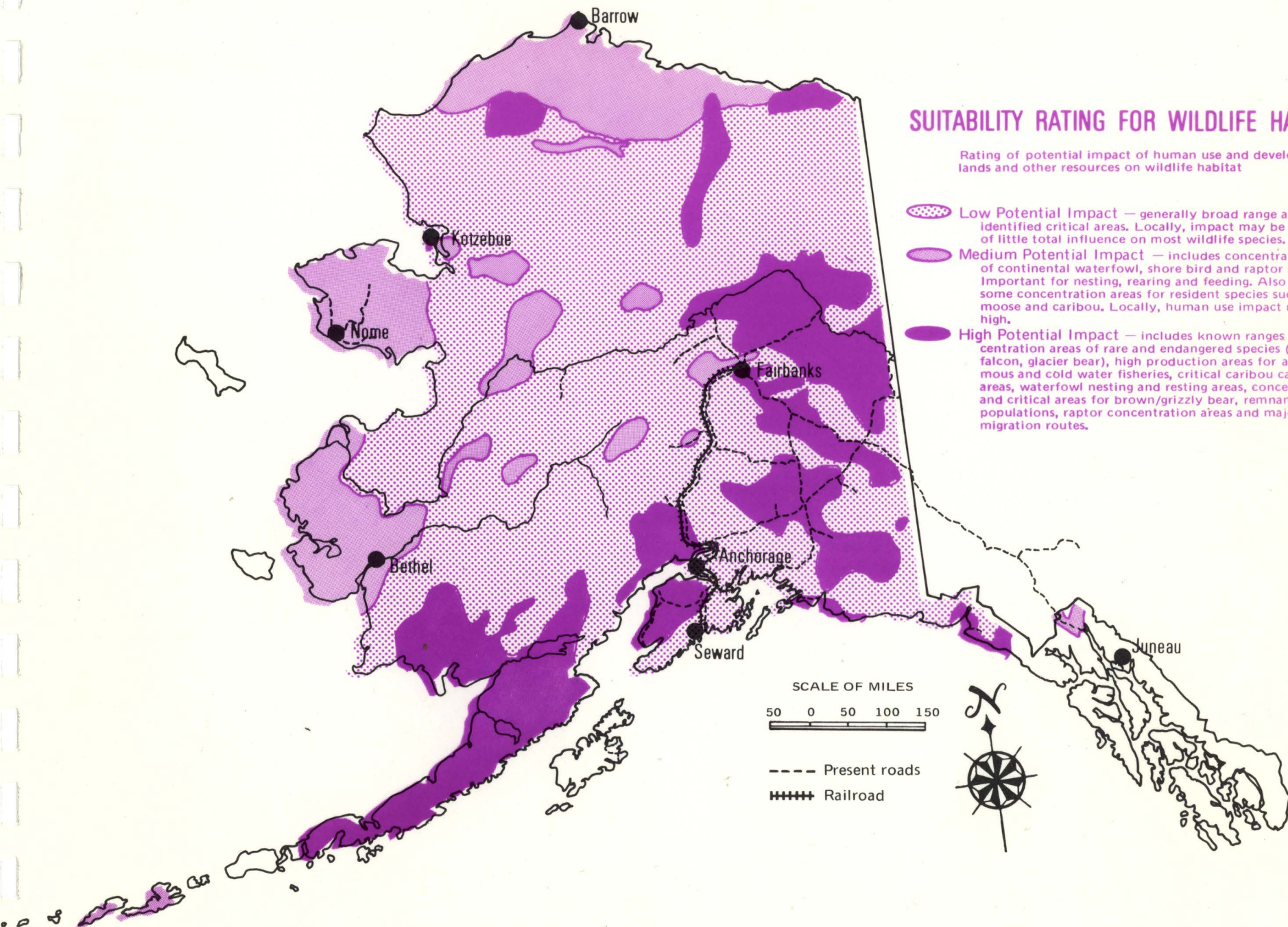
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SUITABILITY RATING FOR WILDLIFE HABITAT

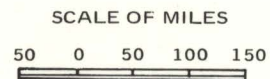
Rating of potential impact of human use and development of lands and other resources on wildlife habitat

-  Low Potential Impact — generally broad range areas, few identified critical areas. Locally, impact may be high, but of little total influence on most wildlife species.
-  Medium Potential Impact — includes concentration areas of continental waterfowl, shore bird and raptor species. Important for nesting, rearing and feeding. Also includes some concentration areas for resident species such as moose and caribou. Locally, human use impact may be high.
-  High Potential Impact — includes known ranges and concentration areas of rare and endangered species (peregrine falcon, glacier bear), high production areas for anadromous and cold water fisheries, critical caribou calving areas, waterfowl nesting and resting areas, concentration and critical areas for brown/grizzly bear, remnant sheep populations, raptor concentration areas and major caribou migration routes.

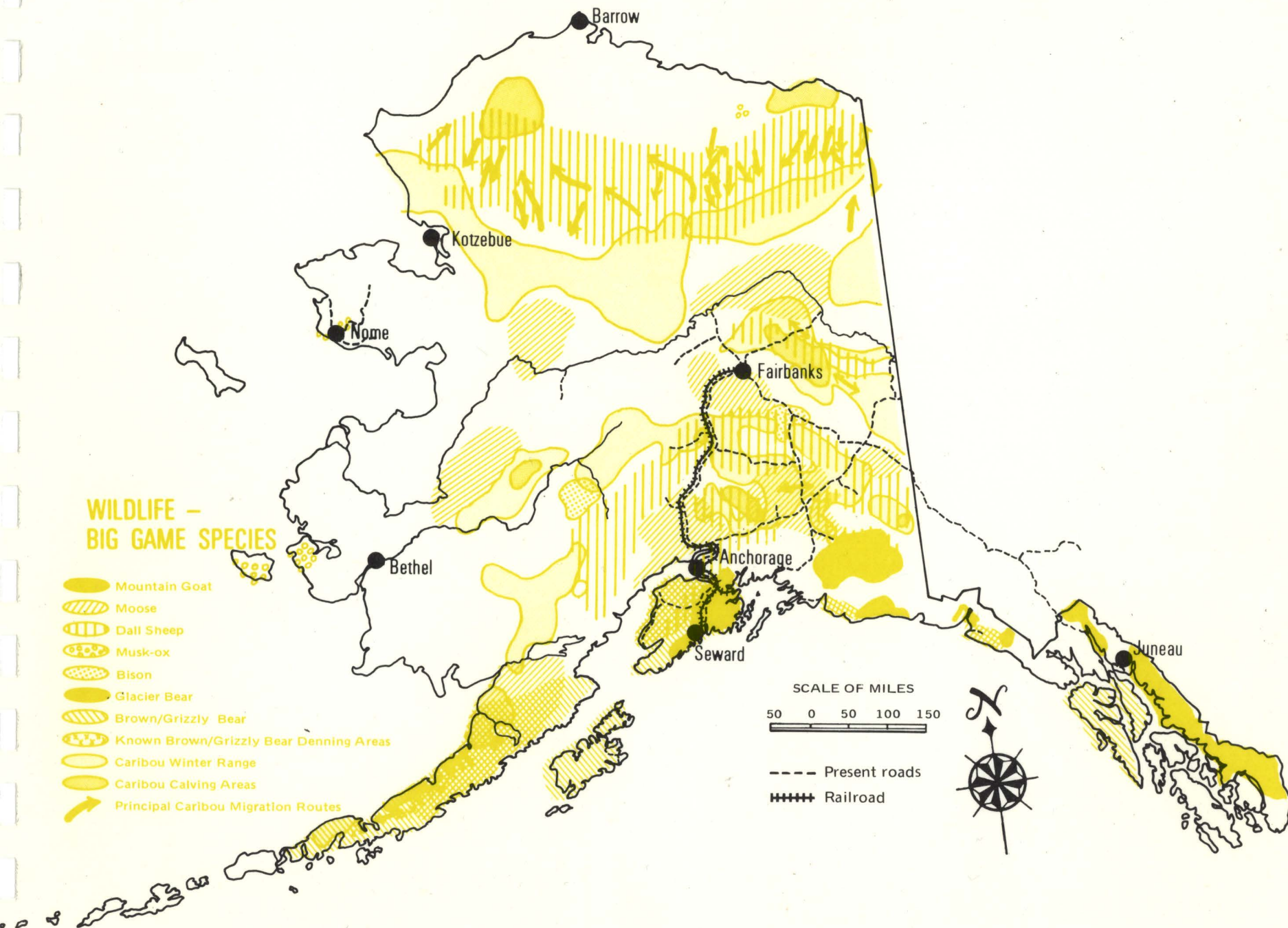


WILDLIFE — BIG GAME SPECIES

-  Mountain Goat
-  Moose
-  Dall Sheep
-  Musk-ox
-  Bison
-  Glacier Bear
-  Brown/Grizzly Bear
-  Known Brown/Grizzly Bear Denning Areas
-  Caribou Winter Range
-  Caribou Calving Areas
-  Principal Caribou Migration Routes

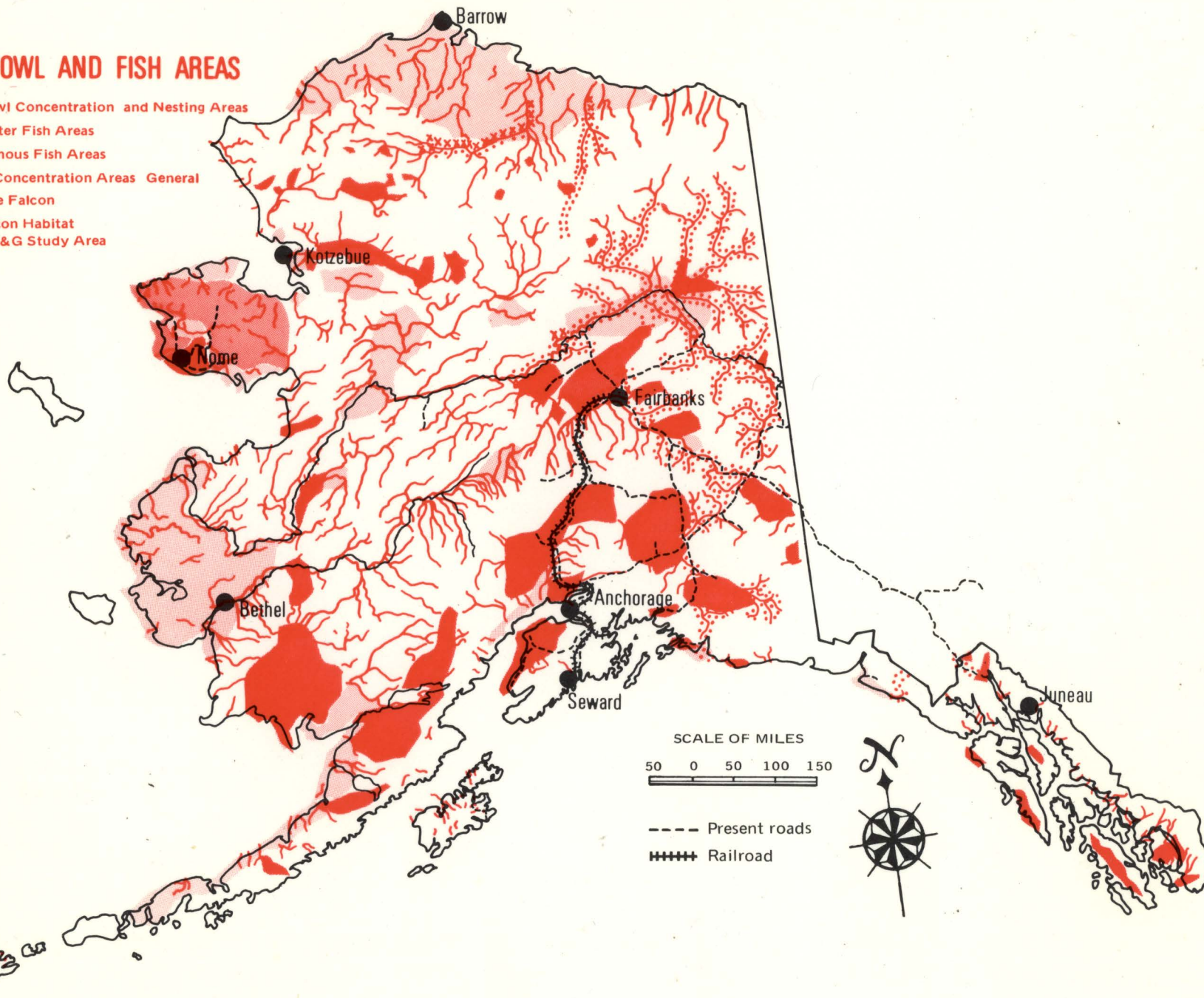


--- Present roads
 +++++ Railroad



WATERFOWL AND FISH AREAS

-  Waterfowl Concentration and Nesting Areas
-  Cold Water Fish Areas
-  Anadromous Fish Areas
-  Raptor Concentration Areas General
-  Peregrine Falcon
-  Gyr Falcon Habitat
-  ADF&G Study Area

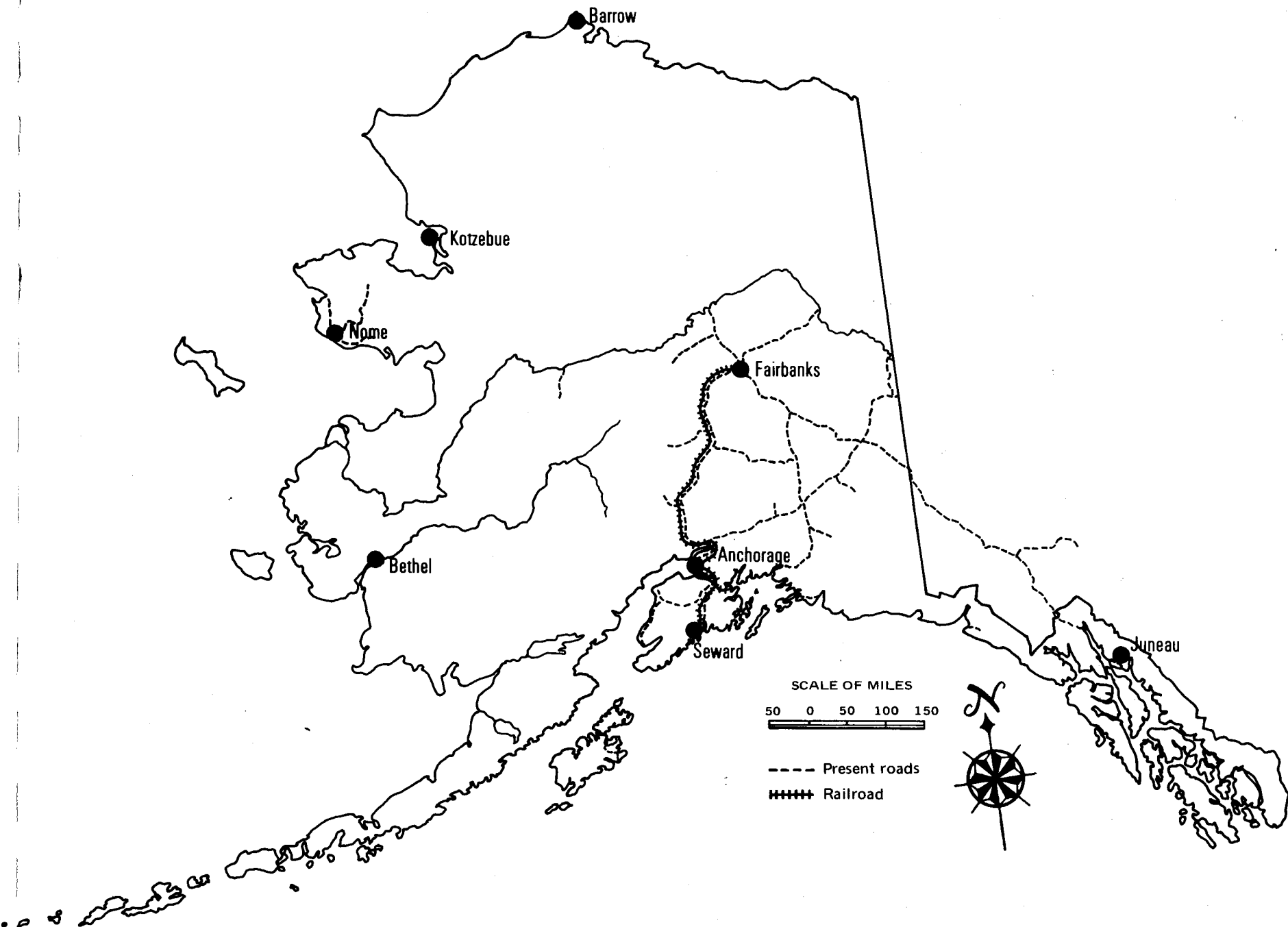


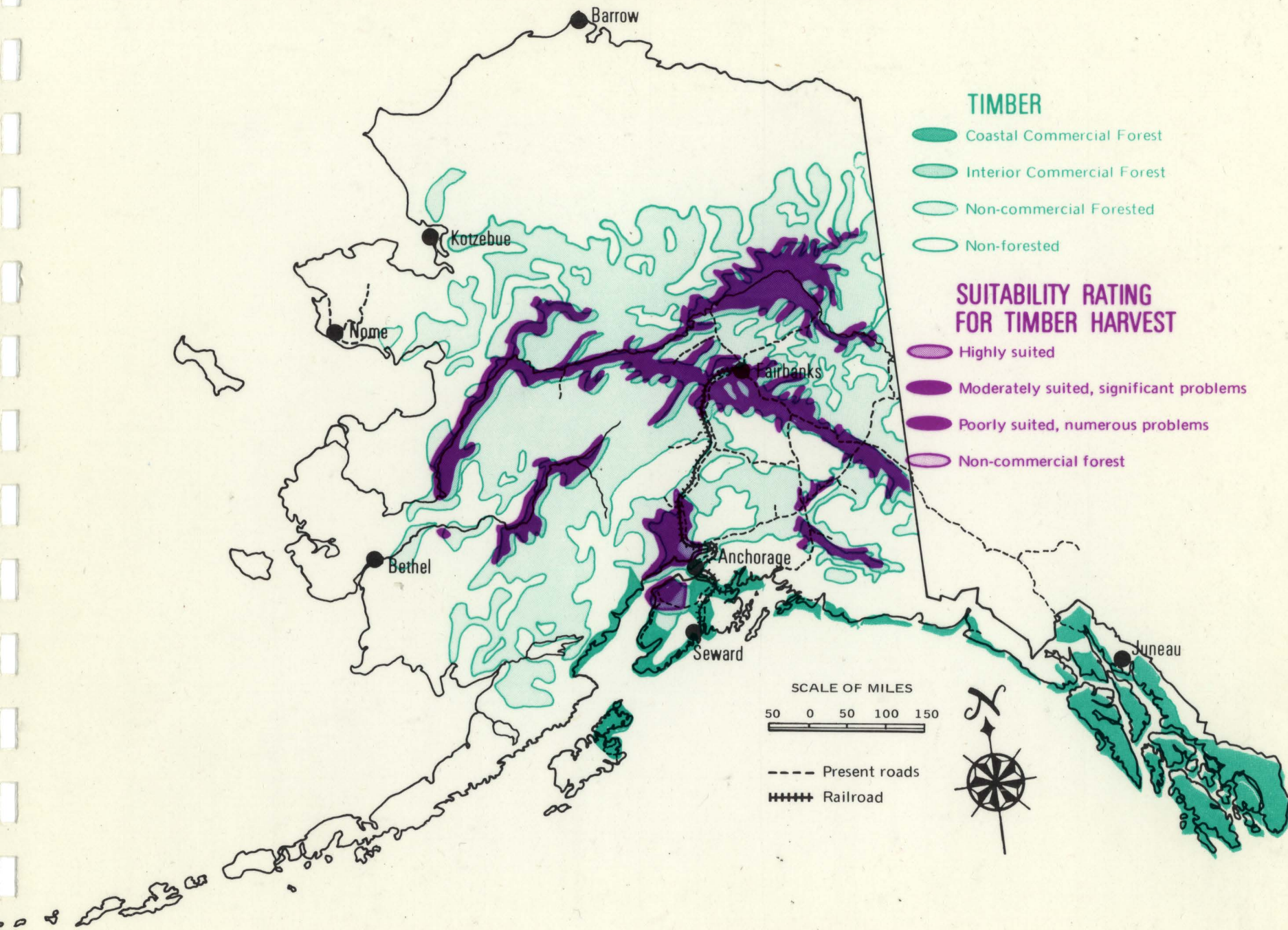
SCALE OF MILES

50 0 50 100 150

--- Present roads

++++ Railroad



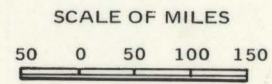


TIMBER

- Coastal Commercial Forest
- Interior Commercial Forest
- Non-commercial Forested
- Non-forested

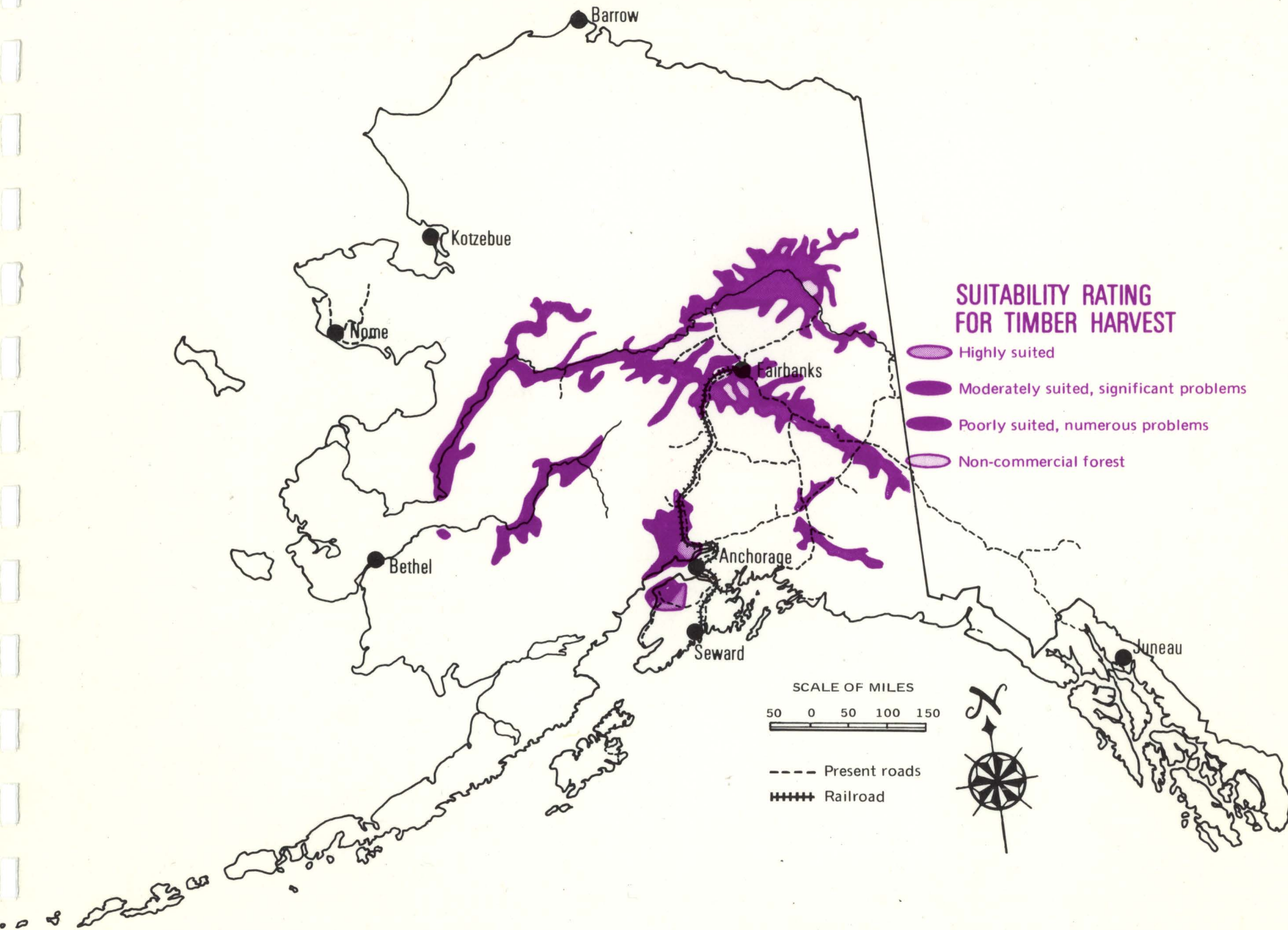
SUITABILITY RATING FOR TIMBER HARVEST

- Highly suited
- Moderately suited, significant problems
- Poorly suited, numerous problems
- Non-commercial forest



- Present roads
- Railroad





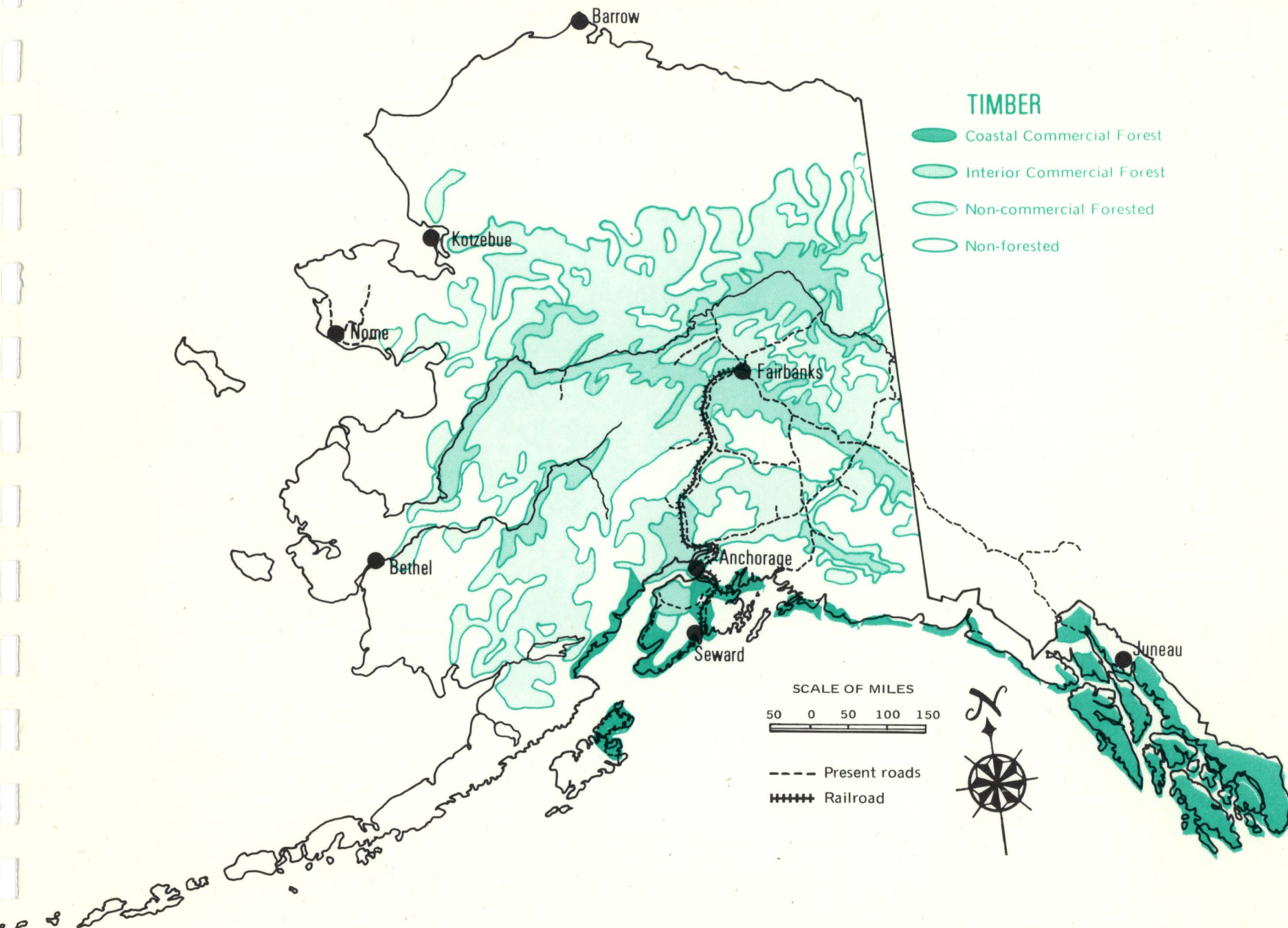
SUITABILITY RATING FOR TIMBER HARVEST

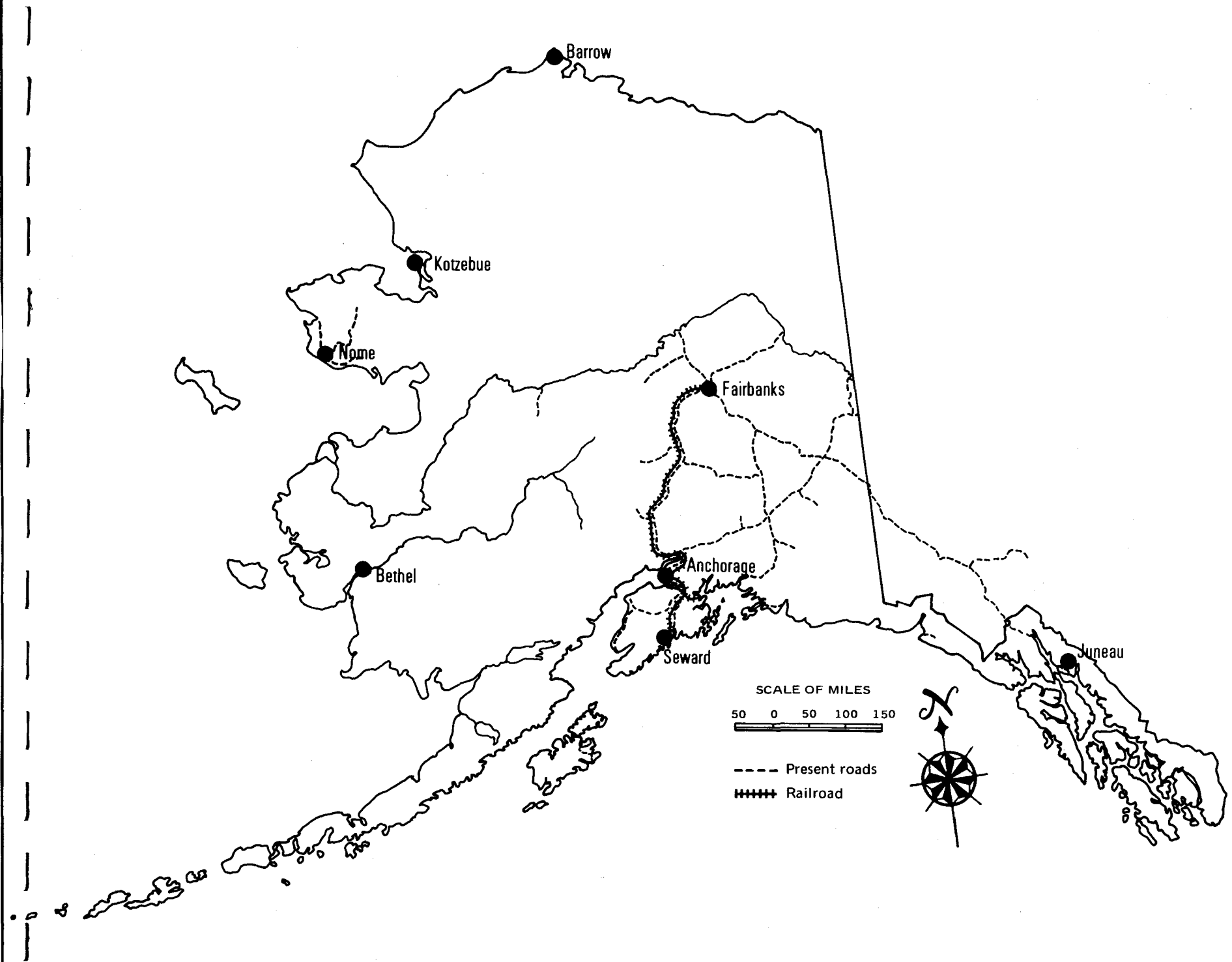
- Highly suited
- Moderately suited, significant problems
- Poorly suited, numerous problems
- Non-commercial forest

SCALE OF MILES
50 0 50 100 150

--- Present roads
++++ Railroad







No attempt will be made to describe the ratings for each of the resource areas defined by the enclosed lines. The results of the analysis in this process can only be comprehended through visual study of the resource profile maps and the determinants used. As an example, a forested area identified as commercial forest in the resource profile, but underlain with shallow soil and permafrost condition, could be coded T3 for a given area to reflect a low amenability for environmental modification.

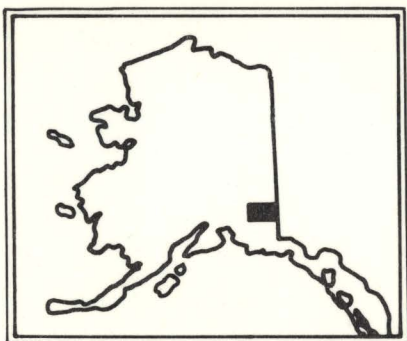
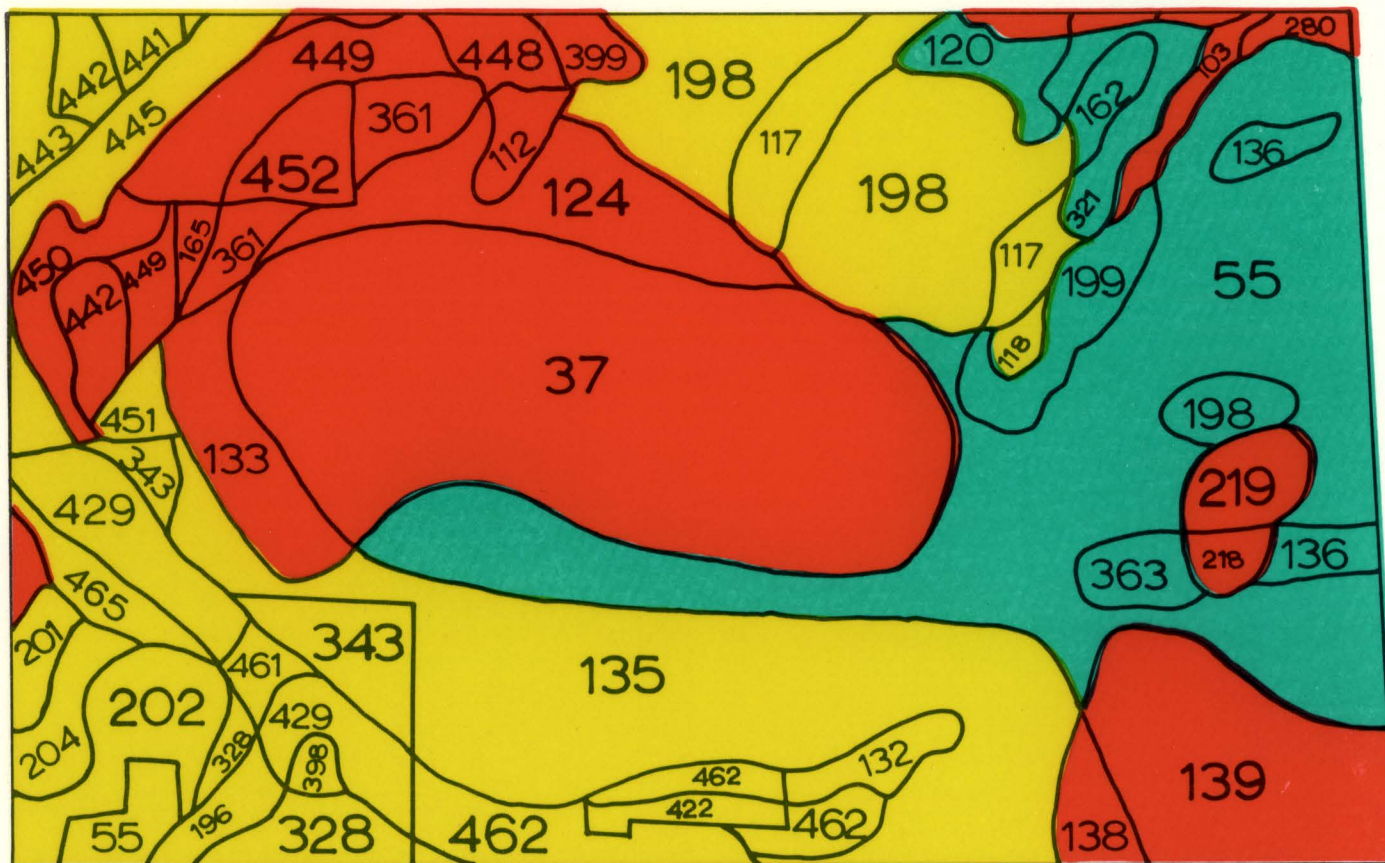
Stated in another way, the numerical weights do not mean use or development should occur or not take place; but point to the likely environmental cost which one may have to pay if uses and development occur.

Examples of the Single Resource Suitability evaluation maps are illustrated and shown in this section by the reduction maps drawn for Wildlife Habitat, using the Big Game species and the Waterfowl and Fish resource profile maps. In addition, a brief narrative support, telling how each of the resource disciplines established the determinants from the subsystems of the natural environment and how they related the findings to the resources and areas under assessment, is appended under Appendix B.

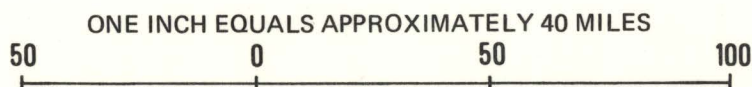
Multi-Resource Suitability Map and Key Table

Taken singularly, each of the seven suitability rating maps gives only a single resource suitability assessment for any given area. Each single suitability rating map in transparency form, placed one upon another, provides a wealth of resource information with an insight into the potential multi-use capabilities and conflicts for any given area.

To maximize the benefit of this informational flow, a composite map was developed through the map transparency and sieve techniques which showed a grouping of the resource combinations with their respective ecologically oriented weight assessments. What resulted was a multi-resource suitability portrayal for any given area.



MULTI-RESOURCE SUITABILITY RATINGS (excerpt)



When each enclosed area (an island of resource values defined by enclosed lines) with similar combination of resource values and assessed weights was identified or assigned a number, this identification formed a basis for a key table which developed 559 variables, combinations of resources, and use suitability weights.

An illustrated enlargement of the multi-resource suitability, with the numerical identifications for a given region in Alaska, is shown in this section along with the three level land use color codes discussed in the next section. The Key Table for the enlarged illustration area and for the Series E scale Multi-Resource Suitability work map is appended under Appendix C of this report.

Here again, no attempt will be made to describe the multi-resource suitability evaluations. The results of this analysis can only be comprehended by visual study of the multi-resource suitability map and the definitions on the Key Table for each numbered area.

Predominant Land Use Suitability Forms

Each of the 559 variable combinations and each occurrence of the same combination interpreted on the multi-resource suitability map tells about intrinsic or implied land use forms for a given area; but to be more useful, each variable or numbered area identified must be simplified or related to some grouping or classification of land use forms.

To attain this transformation, a three level land use form grouping was used with a color identification on the multi-resource suitability map. The three predominant land use form groupings color codes were defined as follows:

Green = Areas with potentials for use and development of the resources--with certain limitations, generally amenable to man's use and development.

Orange = Areas with unique, scarce, or vulnerable resource values--generally reflecting low amenability to man's use and development if the identified values are to be protected.

Yellow = Areas generally amenable to man's use and development, but with critical potentials for conflict with unique, scarce, or vulnerable resource values.

The process of relating the numbered area on the multi-resource suitability map to the predominant land use forms involved an interpretation of each numbered combination on the key table, reassessing the resource values identified by checking the resource profile overlay maps through the map transparency technique, analyzing the compatibility and potential conflicts, and forming a judgment as to which predominant land use grouping the assessed area is best fitted. The decisions were translated on to the map by coloring the assessed areas with the color code adopted for the three level predominant land use form grouping.

The results of this process are shown on the illustrated enlargement map in the preceding section and illustrated reproduction of the Predominant Land Use Suitability Map shown in this section.

Manageable Units

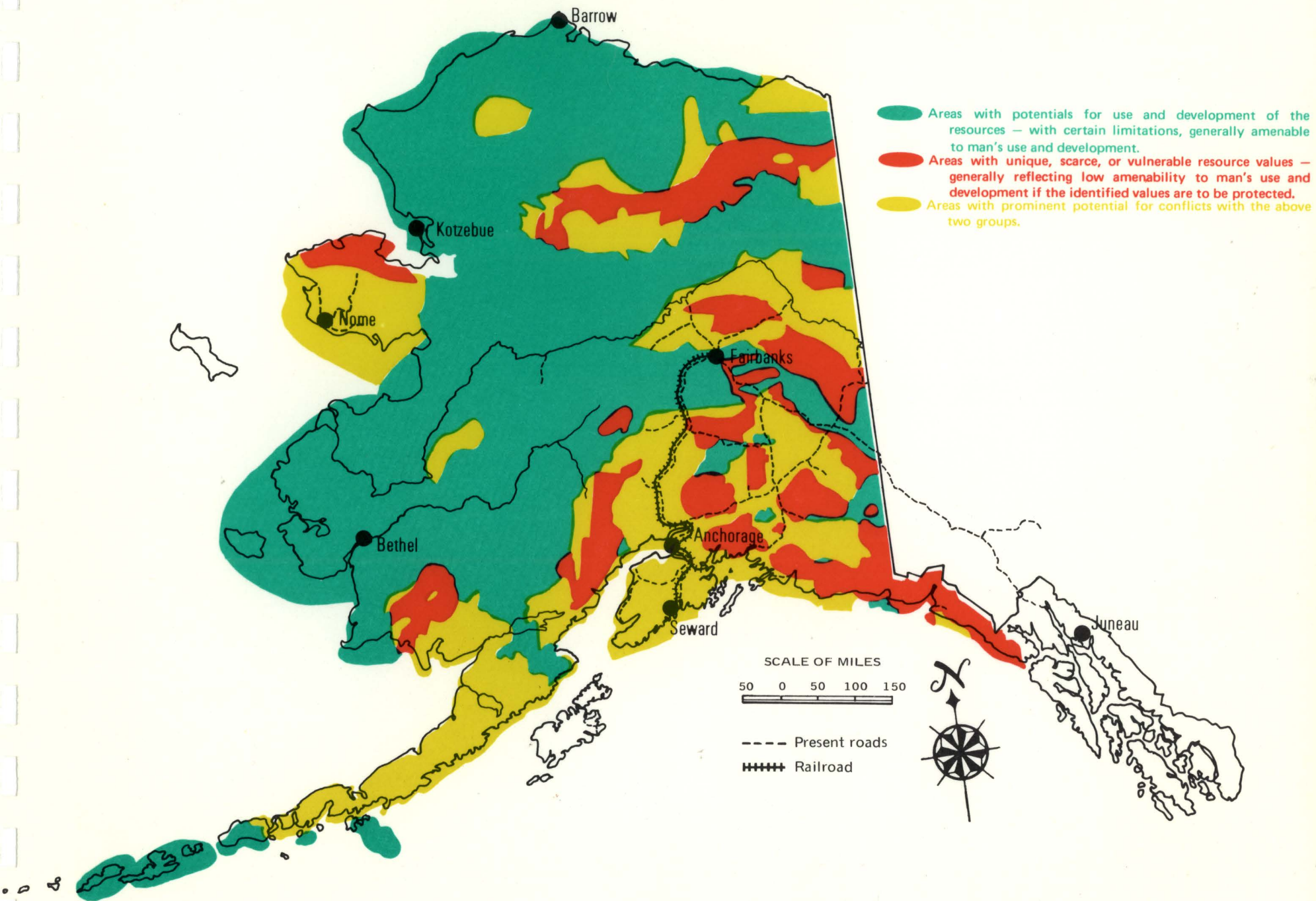
Visually the coloring process of the multi-resource suitability map provided a broad analysis of the similarity, compatibility, or potential conflicts of each of the assessed areas in terms of opportunities and restraints to human activities. The process also provided a perspective on the resource management opportunities and gave an indication of the management philosophies which may be applicable for any associated grouping of land areas.

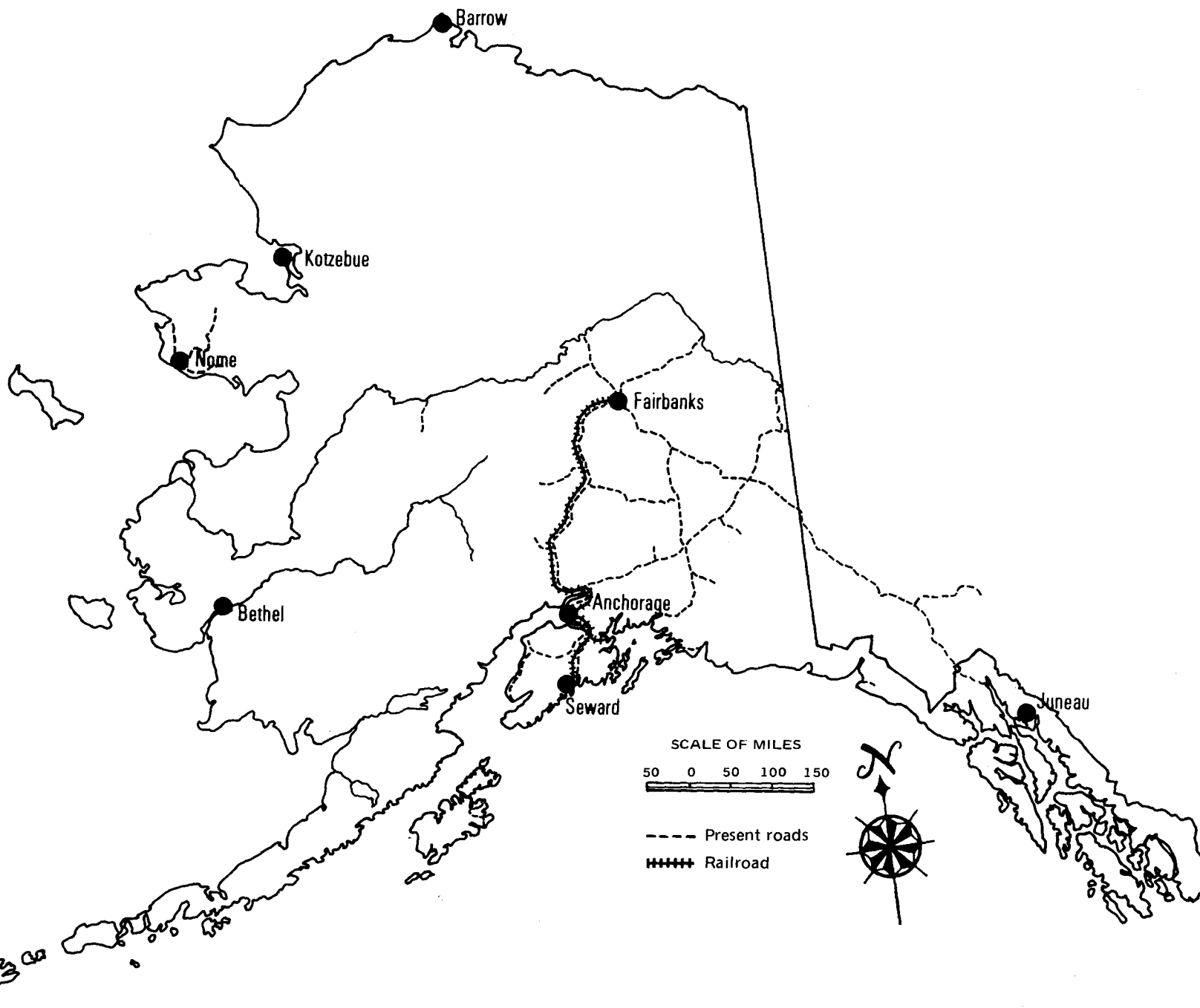
What this meant is that the colored areas on the map, with its keyed definitions and implied ecological associations, served as a first level determinant for defining the manageable units within geographical regions. Tested against topographic features, primarily ridge lines of watersheds, and regional growth assessments (in this study confined to existing and proposed road net, potential hydro power source, village and urban population growth patterns and linkages, and resource development identifications), the initial lines, either readjusted or retained intact, become the basis for definition of the manageable units.

No effort was made to weigh the existing and potential changes in land status or ownership, particularly whether an area was pre-ANCSA withdrawn, d(1) or d(2) lands, patented or TA, State selection applied, and village or regional corporation selection areas. For the purpose of delineating the manageable units as objectively as possible, these factors were neutralized.

It was intended in this approach to regroup or redesignate the d(1) and d(2) lands, and incorporate those remaining lands from the native village and regional corporations' selection areas not selected by the state into the d(1) or d(2) category. What is portrayed is the manageable units which should be managed under the most applicable management philosophies, or, as far as the Federal lands are concerned, managed by one agency.

This process resulted in definition of 28 manageable units (excluding the Southeastern region). A reduction map showing the location of the 28 manageable units is illustrated in the next section with the regional analysis maps.





Regional Analysis

Alaska's economy today is associated with oil and gas, fisheries, timber, and the large role played by government employment. The economy is characterized by high prices, high unemployment, seasonal fluctuation, and heavy reliance on government expenditures. What will happen to Alaska from an overall resource development future hinges on how the supply aspects of its economy change with respect to the level of demand (as reflected by the growths in world population and affluence), changes in technology, environmental ethics, and discovery of new resources. The situation for change ahead calls for an assessment of Alaska's resource endowment; but its development for the new future must be adapted to its environment, population, social overhead cost (infrastructures), and the geographic condition which exist today. Stated in another way, we need a strategy of goals and policies for regional development.

With the impending distribution of land ownership patterns set by the Alaska Native Claims Settlement Act and the Statehood Act, it becomes critical how the lands in the federal ownership fit into the development potentials of each region. While it is debatable whether we know enough about regions in Alaska and their development potentials, we know something about each region for a start. The choice need not be between all or nothing.

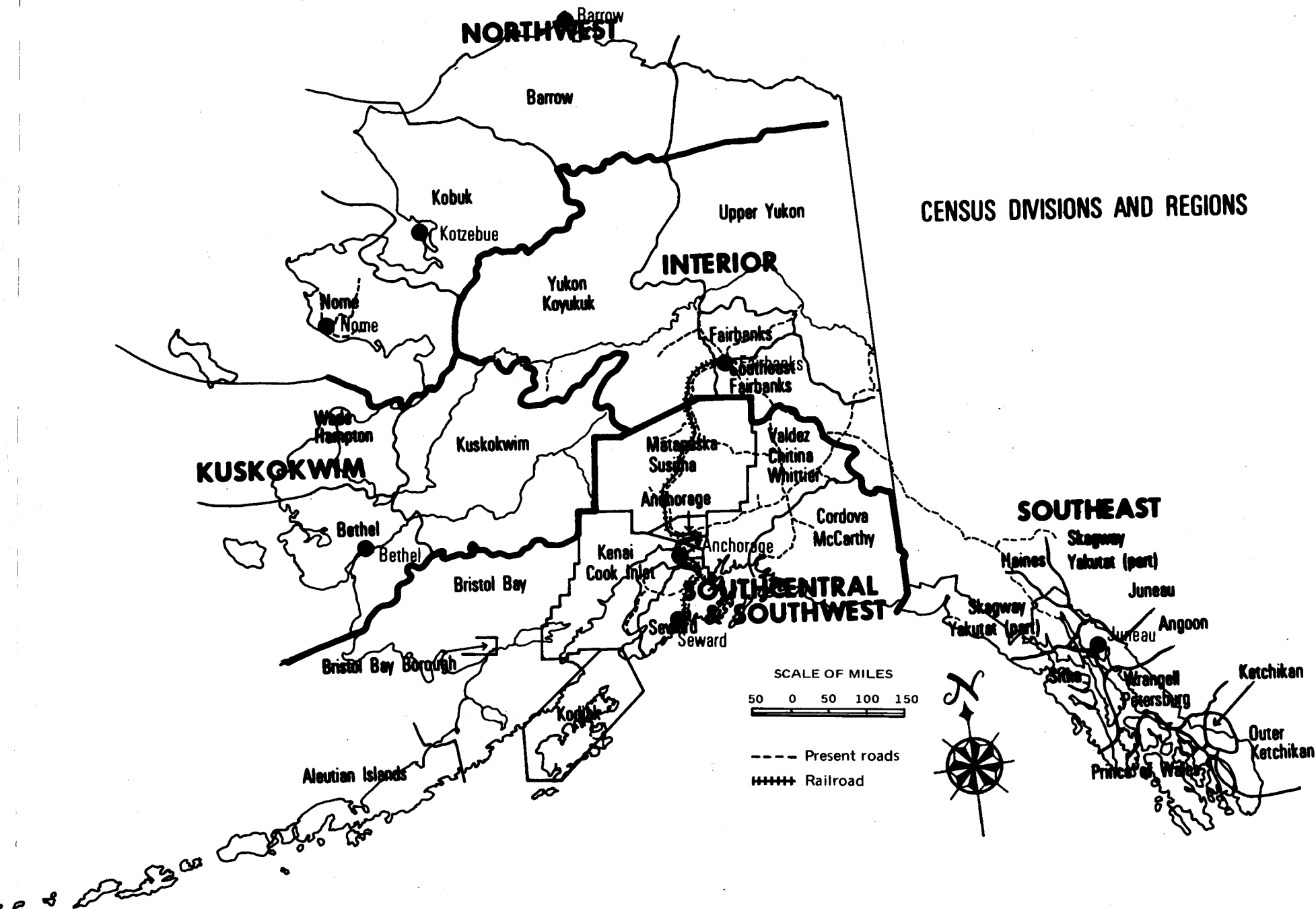
The following discussion and the tabular information and maps attempt to show the contrast between the four Regions identified where most of the land tenure changes will occur. Items covered include the following:

- . The 1970 population by census districts (the plus or minus mark indicates the population change from the 1960 census).
- . The percentage of Native population in each census district.

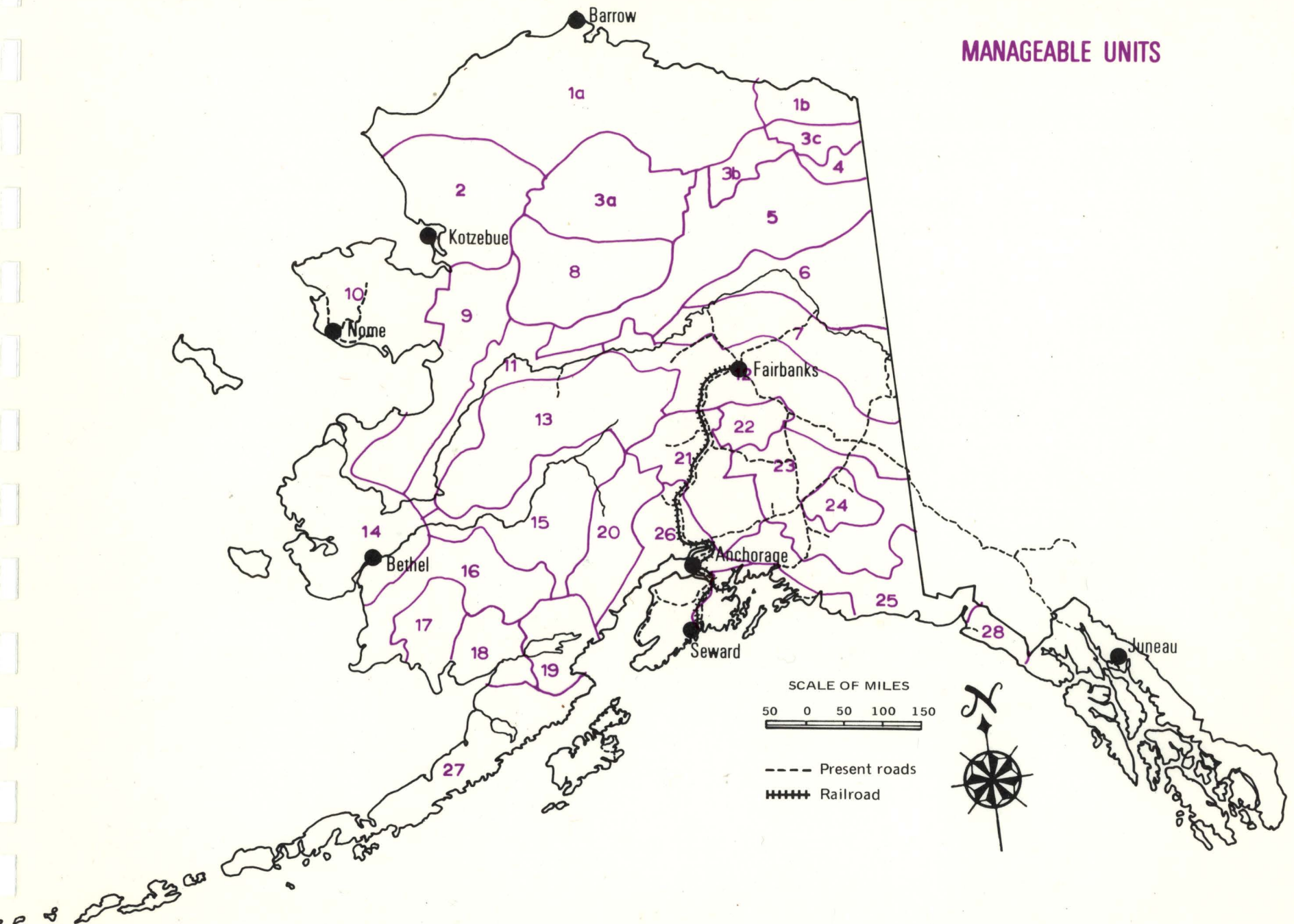
- . Per capita personal income by censal districts (the higher averages generally reflect the weight of the non-native population).
- . Basic economic dependency of each subregion (censal district).
- . Economic growth potentials associated with resource development for each subregion (potentials are listed without association to time frame).
- . High aesthetic amenity areas to provide a broad perspective on the distribution and location in relation to the four Regions.
- . Transportation linkages, both existing and potential, to show the opportunities and limiting factors for resource development by Regions.
- . Hydropower sites, both existing and potential, also reflect the opportunities and limiting potentials for the future development of the Regions.

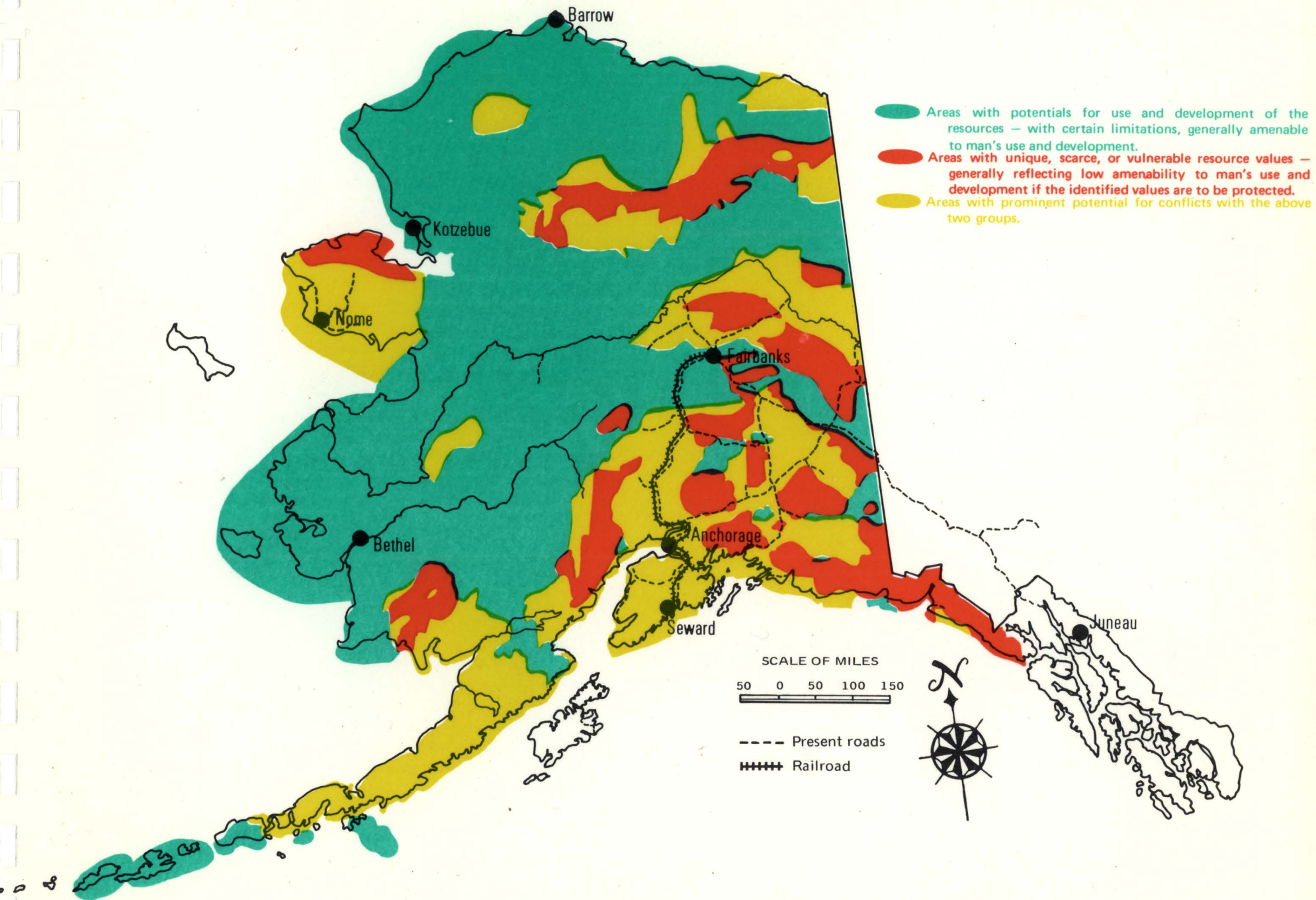
Of specific interest is the stark contrast between the socio-economic well-being between the Natives and non-Natives and between rural and urban Alaska. The Southcentral Region, with Anchorage as its hub, is a focal point, particularly with its transportation linkages to the other Regions. Other regional centers include Fairbanks for the Interior Region; Bethel for the Kuskokwim Region; and Nome, Kotzebue, and Barrow for the Northwest Region.

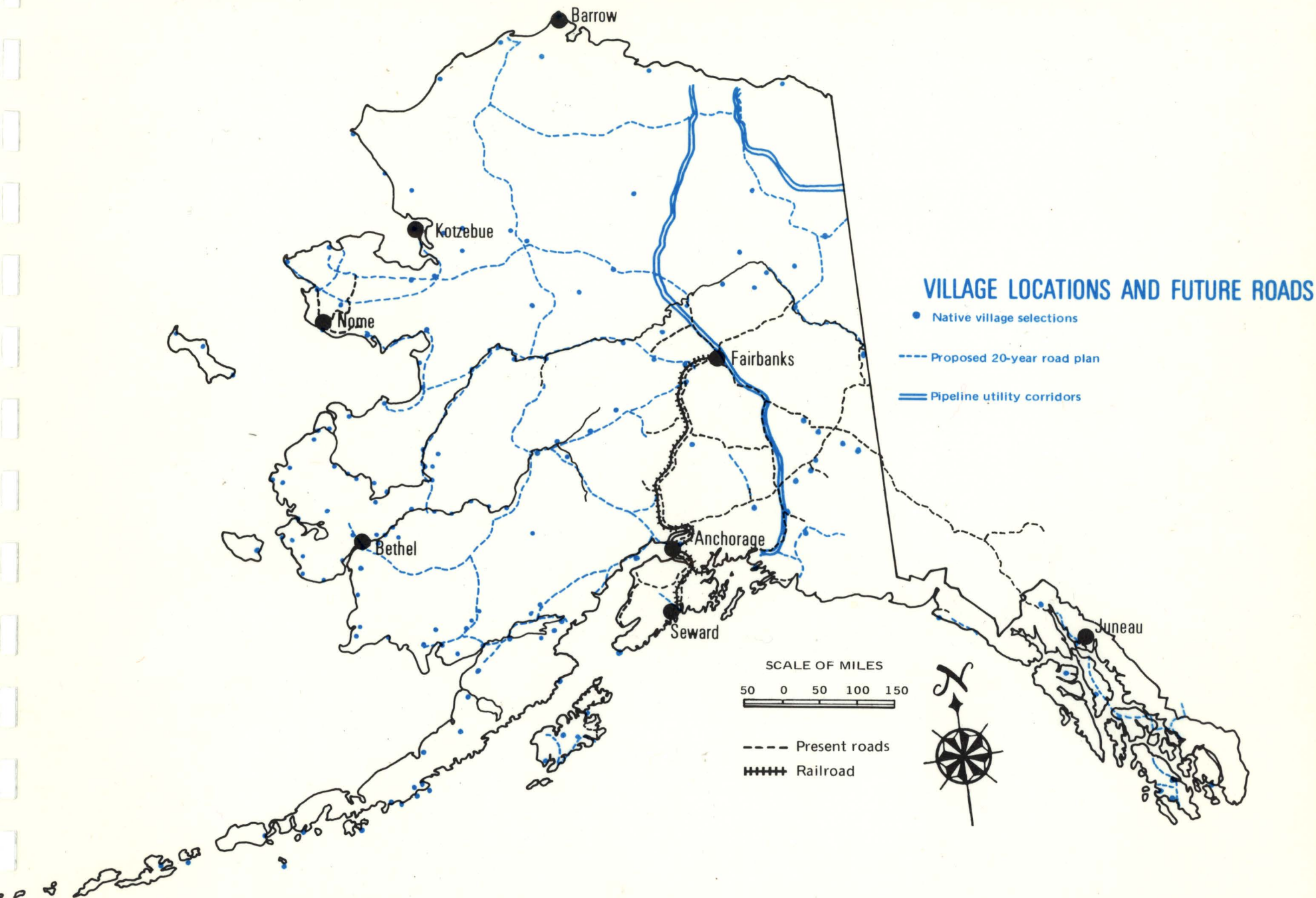
CENSUS DIVISIONS AND REGIONS

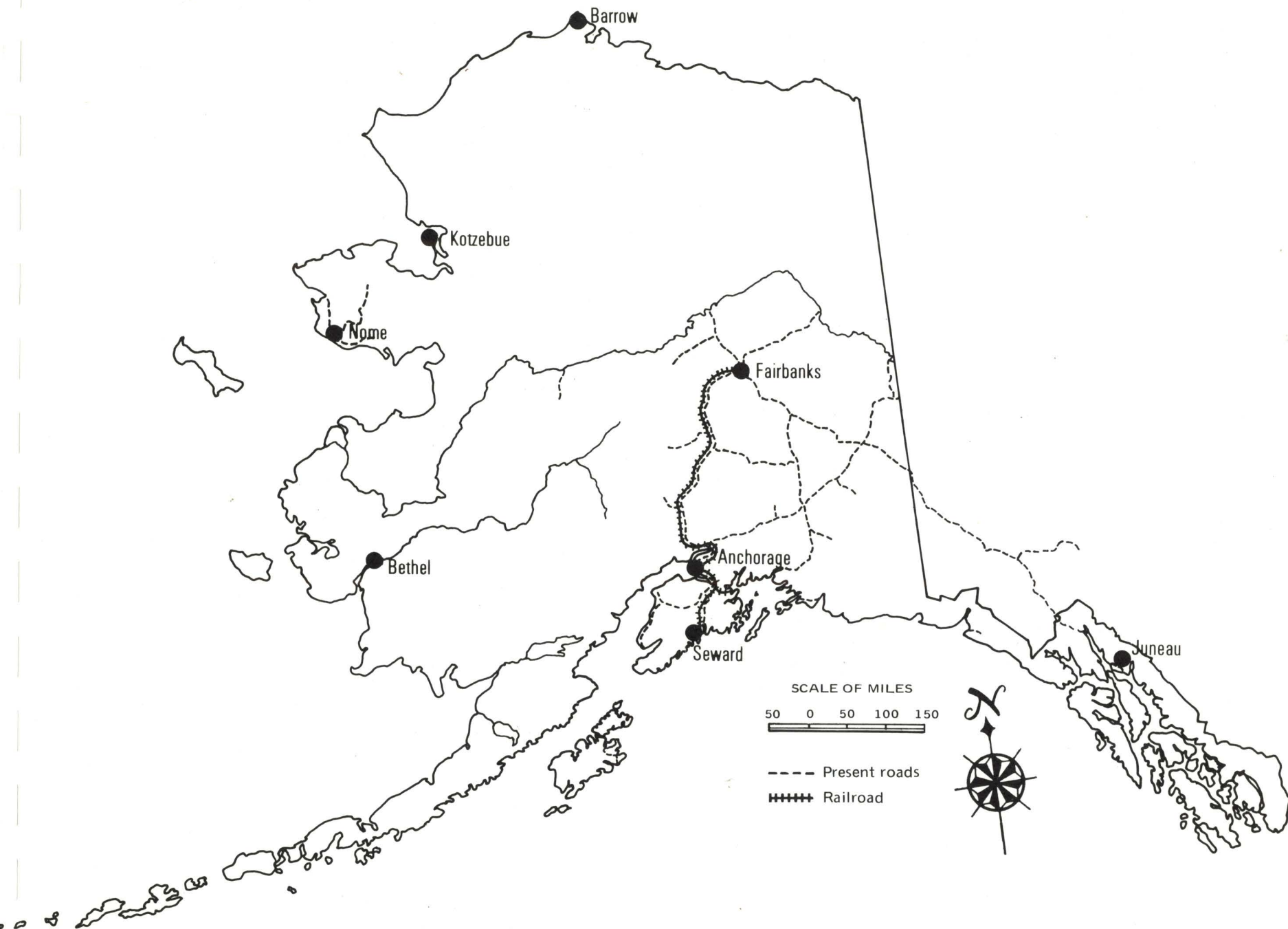


MANAGEABLE UNITS









SOUTHCENTRAL REGION

Subregions (censal districts)	Aleutian Islands	Bristol Bay	Kodiak	Kenai- Cook Inlet	Seward	Anchorage	Matanuska- Susitna	Valdez- Chitina- Whittier	Cordova McCarthy
<i>1970</i>									
<i>Population</i>	8057(+)	4632(+)	9409(+)	14,250(+)	2336(-)	126,333(+)	6509(+)	3098(+)	1857(+)
<i>Percent Native Population</i>	94	85	19	14	-	4	4	33	30
<i>Per Capita Income</i>	2480	1880	2866	3858	-	3909	1410	2530	3820
<i>Basic Economic Dependency</i>	<p><i>Aleutian Islands:</i> Government activities, including military, commercial fishing and salmon processing, construction activities, and subsistence hunting and fishing.</p> <p><i>Bristol Bay:</i> Commercial fishing and salmon processing, government activities, including military, air transportation and tourism (sport fishing and hunting operations, and subsistence fishing and hunting).</p> <p><i>Kodiak:</i> Commercial fishing and seafood processing, and Coast Guard and tourism related operations.</p> <p><i>Kenai-Cook Inlet:</i> Major production area for oil and gas. Government activities, and petrochemical, recreation and tourism related operations.</p> <p><i>Seward:</i> Transportation (seaport and railroad terminals) and sport and commercial fishing operations.</p> <p><i>Anchorage:</i> Government activities, including military, backbone of economy. Hub of Alaska's transportation systems, centers for manufactured goods distribution, financial and real estate, oil and gas industry businesses. Other economic activities include construction, tourism, and service operations.</p>								

	<i>Matanuska-Susitna:</i>	Farming and recreation related operations.
	<i>Valdez-Chitina-Whittier:</i>	Commercial fishing and canning (Valdez). Government activities, tourism, and trans-Alaska pipeline related operations (Valdez).
	<i>Cordova-McCarthy:</i>	Commercial fishing and seafood canning (Cordova), and mineral exploration and recreation related operations (McCarthy).
<i>Economic Growth Potentials (resource development)</i>	<i>Oil and Gas:</i>	Kenai-Cook Inlet, Bristol Bay, Matanuska-Susitna, Kodiak, Valdez-Chitina-Whittier subregions.
	<i>Other Minerals:</i>	Copper--Cordova-McCarthy, Matanuska-Susitna, Bristol Bay; Coal--Cordova-McCarthy, Matanuska-Susitna, Kenai-Cook Inlet subregions.
	<i>Fisheries:</i>	Aleutian Islands, Bristol Bay, Kodiak, Seward, Valdez-Chitina-Whittier, and Cordova-McCarthy subregions.
	<i>Forest Products:</i>	Kenai-Cook Inlet, Seward, Matanuska-Susitna, Kodiak, Valdez-Chitina-Whittier, and Cordova-McCarthy subregions.
	<i>Agriculture:</i>	Matanuska-Susitna, Kenai-Cook Inlet, Kodiak, and Aleutian Islands subregions.
	<i>Tourism and Recreation:</i>	All subregions, but principal beneficiary will be Anchorage.
	<i>High Aesthetic Amenity Areas</i>	Katmai National Monument, Iliamna Lake region, Wood River-Tikchik Lake region, Kenai National Moose Range, Mt. McKinley National Park, and Wrangell Mountains region.

		Surface	Air (Commercial)	Marine
Transportation (Existing) Linkage	Railroad:	Seward-Anchorage- Fairbanks Whittier-Anchorage- Fairbanks	Anchorage-Fairbanks Anchorage-Dillingham King Salmon Anchorage-Nome-Kotzebue Anchorage-Kodiak Anchorage-Cordova- Yakutat-Juneau	Seward-Homer Kodiak Whittier-Valdez Cordova
	Highway:	Anchorage-Seward Anchorage-Kenai-Homer Anchorage-Fairbanks Anchorage-Glennallen- Delta-Fairbanks Anchorage-Glennallen-Tok- Haines Junction Anchorage-Glennallen- Chitina Anchorage-Glennallen- Valdez Paxson-Cantwell		
(Potential)	Highway:	Chitina-McCarthy Cordova-Thompson Pass Kenai Peninsula Roads Matanuska-Susitna Roads Palmer-Westshore Cook Inlet-Lake Clark Pass Palmer-McGrath Lake Louise-Denali	Undefined	Homer-Westside Cook Inlet
	Oil Pipeline:	Valdez-Fairbanks-Prudhoe		

Hydropower Sites

	<u>Existing</u>	<u>Potential Projects</u>
<i>Matanuska-Susitna</i>	Eklutna	Denali (Susitna River) Vee (Susitna River) Watana (Susitna River) Devil Canyon (Susitna River)
<i>Kenai-Cook Inlet</i>	None	Chakachatna (Chakachatna River)
<i>Valdez-Chitina-Whittier</i>	Dayville Hanley Creek San Juan	Wood Canyon (Copper River)
<i>Seward</i>	Cooper Lake	None

INTERIOR REGION

Subregions (censal districts)		Yukon-Koyukuk	Fairbanks	Upper Yukon
1970 Population		4752 (+)	45,864 (+)	1684 (+)
Percent Native Population		81	6	89
Per Capita Income		3430	4429	1230
Basic Economic Dependency	Yukon-Koyukuk:	Mostly oriented towards subsistence economy--hunting and fishing. Some military and government operations.		
	Fairbanks:	Aligned towards government activities including military and state university, distributive (trade, service, transportation, communication, and utilities), and tourism related operations. Tanana Valley is second ranking agricultural producer in state. Some small scale timber production from Tanana Valley forest lands. State's only producing coal mine located at Healy.		
	Upper Yukon:	Mostly oriented towards subsistence economy--hunting and fishing. Some government operations.		
Economic Growth Potential (resource development)	Oil and Gas:	Upper Yukon and Yukon-Koyukuk subregions.		
	Other Minerals:	Gold--Yukon-Koyukuk, Fairbanks, and Upper Yukon subregions. Coal--Fairbanks subregion.		
	Fisheries:	None of commercial significance.		
	Forest Products:	Yukon-Koyukuk, Fairbanks and Upper Yukon subregions.		
	Agriculture:	Fairbanks subregion.		

Tourism and Recreation: All subregions, but principal beneficiary Fairbanks subregion.

*High Aesthetic
Amenity Areas*

Central Brooks Range (proposed Gates of the Arctic National
Park area), Yukon Flats.

*Transportation (Existing)
Linkage*

	Surface	Air (Commercial)	Marine
Railroad:	Fairbanks-Anchorage	Fairbanks-Anchorage Fairbanks-Kotzebue-Nome Fairbanks-Barrow-Prudhoe	Commercial navigation on Yukon River
Highway:	Fairbanks-Anchorage Fairbanks-Delta-Anchorage Fairbanks-Tok-Haines Junction Fairbanks-Tok-Eagle-Dawson Fairbanks-Circle Fairbanks-Livengood Fairbanks-Manley Hot Springs		

(Potential)

Railroad: Fairbanks-Thetis Mine (Cape Lisburne) and Nome
Fairbanks-Deadhorse
Fairbanks-Umiat
Fairbanks-Canada

Highway: Livengood-Yukon Crossing-Prudhoe Bay
Livengood-Yukon Crossing-Kobuk
Manley Hot Springs-Ruby-Kaltag-Unalakleet
Nenana-Minchumina-McGrath
Circle-Fort Yukon
Circle-Eagle
Circle-Canyon Village-Arctic Village

Oil Pipeline: Fairbanks-Prudhoe
Fairbanks-Valdez

Hydropower Sites

	<u>Existing</u>	<u>Potential Projects</u>
<i>Yukon-Koyukuk</i>	None	Ruby (Yukon River) Kaltag (Yukon River)
<i>Upper Yukon</i>	None	Porcupine (Porcupine River) Woodchopper (Yukon River) Rampart (Yukon River)
<i>Fairbanks</i>	Chatanika	None

KUSKOKWIM REGION

Subregions (censal districts)	Bethel	Kuskokwim	Wade Hampton
1970 Population	7767 (+)	2306 (+)	3917 (+)
Percent Native Population	94	87	97
Per Capita Income	900	1020	500
Basic Economic Dependency	Bethel:	All three subregions oriented towards subsistence economy--hunting and fishing. Military installations, FAA, Weather Bureau, BIA, PHS, and BLM firefighting.	
	Kuskokwim:		
	Wade Hampton:		
	Bethel:	Commercial fishing and small salmon dressing and freezing operations.	
	Wade Hampton:		
	Bethel:	Platinum mining operations.	
	Kuskokwim:	Small scale gold and mercury mining operations.	
Economic Growth Potential (resource development)	Oil and Gas:	Bethel and Wade Hampton subregions--contain sedimentary basin with oil and gas potential.	
	Other Minerals:	Platinum (Bethel subregion), but workable placer being exhausted.	
	Fisheries:	Bethel and Wade Hampton subregions--some success possible with fishing cooperatives, but fishery resources are not divergent to permit large scale processing.	
	Forest Products:	Bethel, Kuskokwim, Wade Hampton subregions--some potential for Lower Yukon River and Kuskokwim River timber, but volume not large enough to sustain a pulp mill operation from timber within region.	

Agriculture: None.

Tourism and Recreation: Low.

*High Aesthetic
Amenity Areas*

Waterfowl nesting areas; Clarence Rhode National Wildlife Refuge in Bethel subregion, and Yukon River delta in Wade Hampton subregion.

<i>Transportation (Existing) Linkage</i>	<hr/>		
	Surface	Air (Commercial)	Marine
	Highway: Only local roads	Anchorage-Bethel (Other bush connections)	Commercial navigation on Yukon and Kuskokwim Rivers, and marine facility at Bethel
(Potential)	Highway: McGrath-Stoney River-Bethel Ruby-McGrath Ruby-Kaltag Aniak-Stoney River	Undefined	Undefined

Hydropower Sites

<i>Kuskokwim:</i>	<hr/>	
	Existing	Potential Projects
	None	Holy Cross (Yukon River) Crooked Creek (Kuskokwim River)

NORTHWEST REGION

Subregions (censal districts)	Nome	Kobuk	Barrow
1970 Population	5764 (-)	4434 (+)	2663 (+)
Percent Native Population	83	95	89
Per Capita Income	1460	730	13,030
Basic Economic Dependency	Nome: Barrow: Kobuk:	All three subregions still dependent on subsistence economy-- hunting and fishing. Money economy domain of non-Natives.	
	Nome:	Government activities (general government, social services, and education), tourist and air terminal operations.	
	Kobuk:	Some government activities and tourist and mineral operations.	
	Barrow:	Defense installation and construction, Arctic Research Laboratory, and North Slope petroleum exploration.	
Economic Growth Potentials (resource development)	Oil and Gas:	Barrow and Kobuk subregions.	
	Other Minerals:	Coal--Barrow subregion. Copper--Kobuk subregion (Ruby Creek). Gold--Nome and Kobuk subregions. Fluorite--Nome subregion (Lost River). Tin--Nome subregion (Lost River).	
	Fisheries:	Limited.	
	Agriculture:	Reindeer grazing in Nome subregion.	

Tourism and Recreation: All three subregions, but mostly Nome subregion.

*High Aesthetic
Amenity Areas*

Noatak region, Arctic Wildlife Range.

	Surface	Air (Commercial)	Marine
<i>Transportation (Existing) Linkage</i>	Highway: Nome-Teller Nome-Marys Igloo Nome-White Mountains Other local roads	Nome-Kotzebue-Fairbanks Nome-Kotzebue-Anchorage	Commerical navigation on Kobuk and Noatak Rivers, and limited marine facility at Nome and Kotzebue
<i>(Potential)</i>	Railroad: Nome-Cape Lisburne-Kobuk-Fairbanks	Undefined	Undefined
	Highway: Nome-Buckland-Kobuk Nome-Unalakleet-Kaltag Barrow-Kobuk PET 4-Arctic Wildlife Range		
	Pipeline: Prudhoe-Fairbanks Prudhoe-Canada		

Hydropower Sites

Kobuk

<u>Existing</u>	<u>Potential Projects</u>
None	Agashashok (Noatak River)

Resource Management Opportunities

This part is the ultimate transformation point in the inductive process of this study. It provides a summation of the salient resource features and a conclusion on the implied management philosophies for each of the 28 manageable units identified.

The definition for the suitability conclusions and the summation on each of the 28 manageable units with approximate acreages are shown under the following subsection.

DEFINITIONS OF LAND USE SUITABILITY CLASSIFICATIONS*

Utilization

Lands generally suitable for or amenable to the extraction of non-renewable resources and the production and use of renewable resources.

Conservation

Lands generally suitable for or amenable to the extraction of non-renewable resources and the production and use of renewable resources but which conflict with scarce, fragile, or unique resources.

Protection

Lands generally containing scarce, fragile, or unique resources where use and development may cause significant losses of these resources. Human use and development would have to be carefully controlled, restricted, and in some cases development eliminated entirely in order to preserve the resources.

*NOTE: These suitability classifications are not to be considered as being mutually exclusive. Any given area may contain elements of all three categories of land. The assessment made here is based on the most prevalent character of any area. Where suitabilities may have co-dominant features, both may be expressed. Subsequent, more detailed planning may resolve many conflicts or compromise actions to result in minimal adverse impacts on the environment.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

(1a - 41.3)

(1b - 1.4) 42.7 MILLION ACRES

MANAGEABLE UNIT NO. 1

RESOURCE VALUES:

Grazing	Potential reindeer grazing. Historical use, but no present use.
Timber	None.
Land	Seven native village selection withdrawals, Naval Petroleum Reserve 4, Arctic National Wildlife Range, segments of 2 proposed utility corridors.
Mineral	Ninety percent of unit in possible petroleum province including PET 4 and Prudhoe Bay fields; 20% of unit has high grade coal; locatable minerals in far eastern part of unit--key types copper and tin.
Water	Extensive exploration necessary to obtain ground water supplies. Deep wells generally required; water quality generally poor. Surface waters of generally poor quality but variable; supply limited in winter.
Habitat	Forty percent of unit in waterfowl area, major peregrine and other raptor nesting areas; 2 major caribou calving areas; general caribou summer range; fringe of Brooks Range Dall sheep population; portions of caribou major migration path; small introduced herd of muskox; grizzly bears and wolves located in unit.
Recreation	Two segments of rivers under study for inclusion in the National Wild and Scenic River System; about 3 million acres identified exceptional scenic values; about a million acres identified exceptional primitive values; north coast Eskimo settlement cultural and archeological values.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area utilization oriented

KEY RESOURCE CONSIDERATIONS:

Known petroleum province with two known oil and/or gas producing fields, waterfowl production area, other critical wildlife habitat.

KEY CONFLICTS:

Potential conflict between oil/gas production and waterfowl production in narrow band along coastline, potential Wild and Scenic Rivers, caribou calving areas, major caribou migration routes. Management objectives of the Arctic Game Refuge run counter to utilization.

ACCESS:

Current access primarily by air, by boat along coastline during a restricted open water season. State long-range plans call for development of highway access via the utility corridor with lateral feeders.

RESOURCE MANAGEMENT OPPORTUNITIES

- SALIENT FEATURES -

MANAGEABLE UNIT NO. 2

15.2 MILLION ACRES

RESOURCE VALUES:

Grazing	Potential reindeer grazing. Historical use, some recent; limited present use in extreme southern portion of unit.
Timber	None.
Land	Six native village selection withdrawals; Noorvik I.R.; 4 hydro powersite classifications. Thirty percent of unit in possible petroleum province; 25% of unit with low grade coal; 66% of unit mineralized with locatables--copper and gold key types.
Water	Extensive exploration necessary to obtain ground water supplies; wells generally deep and water quality generally poor. Surface waters of poor to fair quality, supplies limited in winter.
Habitat	Minor waterfowl nesting; major cold water fishery on Kobuk; raptor concentrations, Dall sheep range; major caribou migration route; caribou winter range; and musk ox transplant.
Recreation	Three segments of rivers under study for inclusion in the National Wild and Scenic River System; one million acres identified exceptional scenic values; one million acres identified exceptional primitive values; contains segment of Nome-Wiseman trail.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented toward utilization.

KEY RESOURCE CONSIDERATIONS:

Locatable minerals, primarily copper and gold. Bornite copper prospect under active exploration, may develop into large copper producing mine. Area within possible petroleum province. Important wildlife habitat areas.

KEY CONFLICTS:

Possible conflict between mineral production and potential recreation opportunities, especially Wild and Scenic Rivers and primitive values.

ACCESS:

Unit accessible by air, local travel by boat along coastline and on rivers and lakes. State plans indicate highway tie from present highway system to Bornite and Kotzebue. Also under consideration is a rail line from Fairbanks to Bornite.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 3

RESOURCE VALUES:

(3a - 10.7)

(3b - 4.6) 17.9 MILLION ACRES

(3c - 2.6)

Grazing	Some potential reindeer grazing.
Timber	None.
Land	One native village selection; segments of two utility corridors; Arctic Wildlife Range.
Mineral	No possible petroleum province; no coal; and 40% of area mineralized--gold key type.
Water	Extensive exploration necessary to develop ground water supplies; deep wells generally required, yielding poor quality water. Surface waters generally poor to fair quality; supplied limited in winter.
Habitat	Dall sheep; caribou migration route; and small area of winter range for caribou.
Recreation	Eight segments of rivers under study for inclusion in the National Wild and Scenic River System; 10 million acres identified exceptional scenic areas; 6 million acres identified exceptional primitive values; cultural features contain hub of Wiseman historic district (1905); segment of Tanana-Fairbanks-Wiseman trail and Nome-Wiseman trail.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented to conservation and preservation.

KEY RESOURCE CONSIDERATIONS:

Exceptional scenic and primitive values, potential Wild and Scenic Rivers, wildlife habitat, locatable minerals.

KEY CONFLICTS:

Potential conflict between mineral production, scenic and primitive values. Unit includes the proposed Gates of the Arctic area.

ACCESS:

Area currently accessible by air. Two proposed utility corridors traverse unit. State plans call for development of highway access via the utility corridor in near future. Proposals have been made to extend railroad north from Fairbanks to the oil fields on the North Slope.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEMENT UNIT NO. 4

1.5 MILLION ACRES

RESOURCE VALUES:

Grazing	None.
Timber	None.
Land	One utility corridor; Arctic Wildlife Range.
Mineral	No petroleum province; no coal; minor amount of area mineralized.
Water	Exploration generally necessary to develop ground water supplies; well depths moderate to deep; water generally of fair quality. Surface waters of fair to good quality; supply restricted in winter.
Habitat	Raptor concentrations; part of Porcupine caribou herd area; and caribou winter range.
Recreation	One river under study for inclusion in the National Wild and Scenic River System; no exceptional scenic and primitive values; no cultural features identified.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented to conservation.

KEY RESOURCE CONSIDERATIONS:

Wildlife values; could be logical addition to the Arctic Wildlife Range.

KEY CONFLICTS:

No obvious or major conflicts expected.

ACCESS:

Present access by air. Utility corridor on southern boundary. If corridor utilized, service road could be constructed.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE AREA NO. 5

16.6 MILLION ACRES

RESOURCE VALUES:

Grazing	Some potential reindeer grazing.
Timber	Little on southern fringe.
Land	Three native village selections; Venetie I.R.; one utility corridor; one hydro powersite classification.
Mineral	Minor possible petroleum province; no coal; 20% of area mineralized--key type gold.
Water	Exploration necessary to develop ground water supplies; wells moderate to deep; water quality medium. Surface waters of medium quality; supplies limited in winter.
Habitat	High concentration of raptor species along major drainage; caribou winter range; fringe of Brooks Range Dall sheep concentration.
Recreation	Two segments of potential Wild and Scenic Rivers; one million acres identified exceptional scenic areas; one million acres identified exceptional primitive values; cultural features contain part of Wiseman historic district and segment of Tanana-Fairbanks-Wiseman trail; small part within 120 miles radius influence zone from Fairbanks.

PREDOMINATE LAND USE SUITABILITY:

Bulk of area oriented to conservation.

KEY RESOURCE CONSIDERATIONS:

Scenic and primitive values; wildlife habitat; locatable minerals; possible petroleum.

KEY CONFLICTS:

Petroleum and other mineral production with wildlife and recreation values.

ACCESS:

Portion of unit within 120-mile influence zone of a major metropolitan area (Fairbanks). Access primarily by air, some riverboat. Utility corridor traverses unit. State plans indicate development of highway access in utility corridor, also highway access to westward (Kotzebue-Bornite). Possible extension of railroad to north and westward would traverse unit.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE AREA NO. 6

14.7 MILLION ACRES

RESOURCE VALUES:

Grazing	None.
Timber	Sixty percent of unit timbered.
Land	Seven native village selections; Venetie I.R.; Ft. Yukon I.R.; utility corridor; one hydro powersite classification.
Mineral	Ninety percent of area in possible petroleum province; some coal. No identified locatable.
Water	Some exploration may be necessary to develop ground water supplies in areas furthest removed from major drainages, wells generally shallow to moderate; water quality medium to good. Surface water quality medium to good.
Habitat	Sixty percent in major waterfowl nesting, concentration of raptors, and known peregrine falcon nesting sites along Yukon River; cold water fishery along major drainage; concentration of moose; winter range for both Porcupine and Fortymile caribou herds.
Recreation	Four segments of potential wild and scenic river; one million acres identified exceptional scenic areas; three million acres identified exceptional primitive values; cultural features include Eagle Historic District, Eagle-Valdez Trail, Eagle and Circle mining districts; segment of Tanana-Fairbanks-Wiseman Trail; portion of Fairbanks mining district terminus of Circle Trail. Contains site for Yukon River Highway bridge crossing; quarter of unit within 120-mile radius influence zone of Fairbanks.

PREDOMINANT LAND USE SUITABILITY:

Area oriented toward conservation and protection.

KEY RESOURCE CONSIDERATIONS:

Wildlife habitat including rare and endangered species, waterfowl production; wild and scenic rivers; exceptional scenic and primitive values; potential petroleum production; potential timber production.

KEY CONFLICTS:

Potential conflict between production of timber and oil and the identified values for wildlife and recreation.

ACCESS:

Highway access to western and southeastern portion of the unit. State plans call for highway connection between Eagle and Circle, forming highway circuit from Fairbanks. Access also by air and boat.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 7

11.1 MILLION ACRES

RESOURCE VALUES:

Grazing	Some potential reindeer grazing. No historical use.
Timber	Significant timber along major drainages.
Land	One native village selection; Ft. Wainwright Military Reserve; utility corridor; part of North Star Borough; 2 hydro powersite classifications, one existing hydro powersite.
Mineral	No petroleum province; minor coal; 10% of area mineralized--key types gold and asbestos.
Water	Some exploration necessary to develop ground water supplies; wells shallow to moderate; water quality medium. Surface waters of medium quality; restricted supplies.
Habitat	Primarily raptor sites; several known peregrine nesting sites; remnant of interior Dall sheep population, and Fortymile caribou herd winter range and calving area.
Recreation	Four segments of potential wild and scenic river; caribou sport hunting; three million acres identified exceptional scenic area; five million acres identified exceptional primitive values; cultural features contain Klondike Gold Rush area (1898), Eagle-Valdez Trail, Fairbanks Trail, Circle Trail, Tanana-Fairbanks Trail, Wiseman Trail, Yukon Historic River, and Fairbanks mining district (1902); 66% of unit within 120-mile radius and small part within 40-mile radius influence zone of Fairbanks.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented to conservation and protection.

KEY RESOURCE CONSIDERATIONS:

Wildlife habitat including rare and endangered species; exceptional scenic, primitive, and historical values; locatable minerals, some timber. Two-thirds of area within 120-mile radius and small part within 40-mile radius of Fairbanks.

KEY CONFLICTS:

Mineral and timber production may conflict with recreation and wildlife values.

ACCESS:

Area presently accessible by road.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 8

12.0 MILLION ACRES

RESOURCE VALUES:

Grazing	Minor potential reindeer grazing. No historical use.
Timber	Timber on Koyukuk drainage.
Land	Six native village selections, utility corridor, Arctic corridor, 2 hydro powersite classifications.
Mineral	Seventy percent of unit in possible petroleum province, minor coal, 10% to 15% of unit mineralized. Key types copper and asbestos.
Water	Restricted supplies of good quality ground and surface water supply. Exploration generally necessary to obtain ground water supplies. Wells moderately deep to deep generally required except in vicinity of major streams. Surface waters originating in unit of fair quality; supplies restricted in winter.
Habitat	Twenty percent of unit in waterfowl nesting area, cold water fishery in Kobuk, winter range for Arctic caribou herd, and moose concentration area.
Recreation	One river segment under study for inclusion in the National Wild and Scenic River System, one million acres identified with exceptional scenic area; cultural features include Nome-Wiseman Trail, tanana-Fairbanks-Wiseman Trail, Kobuk historic mining district, and Onion Portage archeological site.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards utilization.

KEY RESOURCE CONSIDERATIONS:

Possible petroleum production, timber production, some mineral production.

KEY CONFLICTS:

Conflicts possible between production and wildlife habitat and/or potential recreational values.

ACCESS:

Present access primarily by air. Extreme eastern portion traversed by utility corridor, with potential road access within short-term. Long-range plans indicate development of highway access through the unit. Possible access by rail extension between Fairbanks and Bornite.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 9

12.5 MILLION ACRES

RESOURCE VALUES:

Grazing	Extreme northwestern portion and central portion along coast support existing reindeer herds. Remainder has potential for additional reindeer grazing; some historic use.
Land	Includes portion of 12 native village withdrawals.
Timber	None.
Mineral	Ninety percent of area in possible petroleum province; no coal; locatable minor.
Water	Exploration necessary to obtain ground water supplies of generally fair quality. Wells generally moderately deep. Surface waters of generally fair quality; supply limited in winter.
Habitat	Portion of winter range for Arctic caribou herd.
Recreation	Two segments of rivers under study for inclusion in the National Wild and Scenic River System; half-million acres identified for primitive values; cultural features include Nome-Idatarod Trail and part of North America Land Bridge; no major known recreation attraction.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented toward utilization.

KEY RESOURCE CONSIDERATIONS:

Present reindeer grazing use, with potential for expansion into other areas, possible petroleum production.

KEY CONFLICTS:

Potential conflicts expected to be minor between potential oil/gas production and possible Wild and Scenic Rivers, some conflict possible between reindeer grazing and caribou winter range.

ACCESS:

Access primarily by air; some local traffic by boat; annual supplies delivered by ocean freighter. Long-range plans call for development of highway access from present highway net.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 10

13.1 MILLION ACRES

RESOURCE VALUES:

Grazing	Ninety-five percent of area in existing reindeer range.
Timber	None.
Land	Eleven native village selections, Norton Sound IR, White Mountain IR, Wales IR, one potential hydro powersite.
Mineral	Ten percent of area in possible petroleum province, minor coal, 70% of area mineralized. Key types gold, fluorite, platinum and past gold production.
Water	Ground water supplies generally poor to fair. Extensive exploration necessary in northern portion of unit to develop ground water supplies, exploration necessary on most of the remaining area. Wells moderately deep to deep. Surface waters of fair quality, but supplies limited in winter.
Habitat	Twenty percent in waterfowl nesting area, important raptor gyrfalcon area, muskox transplant site.
Recreation	Two million acres identified for exceptional scenic values and 3 million acres identified for primitive values; cultural features include Nome-Iditarod Trail, Nome-Wiseman Trail, Nome mining district (1898). Known major recreation attractions include Nome and Imuruk Lava Beds, significant archeological values associated with North American land bridge, and evolution of Eskimo culture.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards utilization.

KEY RESOURCE CONSIDERATIONS:

Present utilization for reindeer grazing, highly mineralized zone with past, present, and future anticipated production. Possible major fluoride mine in Lost River area. Portion of area in possible petroleum province.

KEY CONFLICTS:

Possible conflicts between production and utilization with wildlife habitat, especially waterfowl and raptors, and exceptional scenic and primitive values.

ACCESS:

Primary access by air, some boat travel. Local highway and road net. Long-range plans call for development of a highway link between the local road net and the present highway system.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 11

8.8 MILLION ACRES

RESOURCE VALUES:

Grazing	Minor potential reindeer grazing.
Timber	Forty percent of unit timbered (along Yukon River).
Land	Nine native village selections, Galena Defense Department withdrawal, three potential hydro powersites.
Mineral	Ten percent in possible petroleum province, minor coal, locatable mineralization unknown.
Water	Restricted supplies of ground and surface water of good quality; most of fair quality. Exploration necessary to develop ground water supplies. Wells moderately deep. Surface waters generally of fair quality, supplies restricted in winter.
Habitat	Twenty percent of area in waterfowl nesting, major cold water fishery, moose concentration area.
Recreation	One river segment under study for possible inclusion in the Wild and Scenic Rivers System; high quality aesthetic opportunities adjacent to Yukon River; cultural features include Yukon Historic River, segment of Nome-Iditarod Trail, and significant archeological values associated with the North America Land Bridge.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented toward utilization.

KEY RESOURCE CONSIDERATIONS:

Timber and possible petroleum production, wildlife habitat, recreation potentials.

KEY CONFLICTS:

Production of timber and minerals may conflict with wildlife habitat and potential wild or scenic river.

ACCESS:

Primarily by air, also by river traffic. Long-range plans indicate highway development across **length of unit.**

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEMENT UNIT NO. 12

17.3 MILLION ACRES

RESOURCE VALUES:

- Grazing Minor potential for reindeer grazing.
- Timber Forty percent to 50% of unit timbered--Tanana River.
- Land Nine native village selections; Tetlin IR; Fort Wainwright, Eielson AFB, and FT. Greeley MR; North Star Borough; Fairbanks; utility corridor; 5 potential hydro powersites.
- Mineral Twenty percent in possible petroleum province; minor coal; minor mineralization--key type gold.
- Water Restricted to plentiful supplies of good quality ground and surface waters. Exploration generally necessary to develop ground water supplies except along some of the main streams and tributaries. Wells moderately deep to shallow, water quality ranging from fair to good. Surface waters generally fair to good; restricted winter supply.
- Habitat Ten percent waterfowl nesting area; raptor concentration area; numerous identified peregrine nesting sites; major cold water fishery; moose concentration area; bison range; some winter range for Steese-Fortymile caribou herd; northern limits of Wrangell Dall sheep; winter range for Mentasta caribou herd.
- Recreation One river segment under study for possible inclusion in Wild and Scenic River System; three million acres identified for exceptional scenic values, and one million for exceptional primitive values; cultural features include: Yukon historic river, Tanana-Fairbanks-Wiseman trail, Circle trail, Fairbanks trail, Eagle-Valdez trail, Fairbanks-Valdez trail, and part of Fairbanks mining district (1902). Majority of unit within 120-mile influence zone of Fairbanks; unit well served by existing transportation network, providing access for the user public.

PREDOMINANT LAND USE SUITABILITY:

Area oriented towards utilization and conservation mix.

KEY RESOURCE CONSIDERATIONS:

Major timber resources, possible petroleum province, some mineralization, primarily gold; wildlife habitat, potential recreation.

KEY CONFLICTS:

Conflicts possible between production and wildlife habitat for rare or endangered species, potential Wild and Scenic River, exceptional scenic and primitive values.

ACCESS:

Area presently served by highway network directly connected to lower 48 states, by rail from Seward, Whittier and Anchorage, and by air.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 13
RESOURCE VALUES:

15.5 MILLION ACRES

Grazing	Minor potential for reindeer grazing.
Timber	None.
Land	One native village selection.
Mineral	No petroleum province; no coal; 30% mineralized--key type gold.
Water	Restricted supplies of good quality ground and surface water. Exploration necessary to develop ground water supplies; wells moderately deep, water quality fair. Surface waters fair to good quality; supplies restricted in winter.
Habitat	Winter range and calving area for McGrath caribou herd; winter range for McKinley herd; moose concentration area.
Recreation	One river segment under study for possible inclusion in Wild and Scenic River System; no scenic or primitive values identified; cultural features include the Iditarod Trail, Iditarod mining district (1910); small part of unit in 120-mile radius influence zone from Fairbanks.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards utilization.

KEY RESOURCE CONSIDERATIONS:

Wildlife habitat, mineralized area with potential for production.

KEY CONFLICTS:

Conflicts between mineral production and wildlife habitat and recreation values are expected to be minor with possible exception of potential Wild or Scenic River.

ACCESS:

Primary access by air. Long-range plans indicate development of highway access across unit.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 14

18.2 MILLION ACRES

RESOURCE VALUES:

Grazing	Potential for reindeer grazing. Some historical use.
Timber	None.
Land	Forty-two native village selections; Clarence Rhode NWR.
Mineral	One hundred percent of unit in possible petroleum province; no coal; mineralization unknown.
Water	Restricted supplies of good quality ground water. Exploration necessary to develop ground water supplies. Wells moderately deep. Surface waters of generally good quality; supplies restricted in winter.
Habitat	Ninety percent of area waterfowl nesting; muskox on Nunivak, and transplant to Nelson Island.
Recreation	One river segment under study for possible inclusion in Wild and Scenic River System; Yukon historic river; potential for waterfowl hunting and observation.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards conservation.

KEY RESOURCE CONSIDERATIONS:

Primary production capability for waterfowl as 90% of area is suitable waterfowl nesting habitat; possible petroleum province.

KEY CONFLICTS:

Oil/gas production may conflict with waterfowl production and habitat. Reindeer grazing may also conflict with waterfowl habitat and production. Other conflicts anticipated to be minor.

ACCESS:

Primary access by air, some local boat traffic. Long-range plans indicate only minor penetration of the area by highway.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 15
RESOURCE VALUES:

15.1 MILLION ACRES

Grazing	Minor potential reindeer grazing.
Timber	Kuskokwim timber stand in entirety.
Land	Fifteen native village selections; McGrath NR; one potential hydro powersite.
Mineral	Thirty percent of unit with possible petroleum province; no coal; 30% of unit mineralized with known mercury and gold productions.
Water	Plentiful to restricted supplies of good quality ground water. Exploration generally necessary to develop ground water supplies except along major tributaries of the Kuskokwim River. Well depth variable to moderately deep. Surface waters variable from good to poor. In eastern portion of unit, surface waters carry glacial flour. Restricted supplies in winter.
Habitat:	Ten percent waterfowl nesting area; bison range; portion of winter range for McKinley caribou herd; portion of Nondalton caribou winter range; westernmost fringe of Alaska Dall sheep.
Recreation	One-half million acres identified with exceptional scenic values; half million acres with exceptional primitive values; cultural features include the Iditarod and Stampede Trails; lies north of McKinley National Park.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented to utilization.

KEY RESOURCE CONSIDERATIONS:

Areas adjacent to streams contain extensive interior commercial timber stands, possible petroleum province, proven mineralization with gold and mercury.

KEY CONFLICTS:

Timber harvesting or mineral production may conflict with wildlife habitat and high scenic and primitive values.

ACCESS:

Primary access by air, some riverboat traffic. Long-range plans indicate network development of highway access.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 16

13.3 MILLION ACRES

RESOURCE VALUES:

Grazing	Potential reindeer grazing; some historical use.
Timber	None.
Land	Five native village selections; Cape Newenham NWR; Cape Newenham MR.
Mineral	Minor possible petroleum province; no coal; 25% mineralized; known gold, mercury, and platinum production.
Water	Plentiful to mostly restricted supplies of ground water. Exploration necessary to develop ground water supplies except for a few areas near the major drainages. Wells moderately deep. Surface waters generally of good to excellent quality; supplies restricted in winter.
Habitat	Major cold water fishery in Mulchatna drainage; caribou wintering area for Nondalton herd.
Recreation	Two river segments under study for possible inclusion in Wild and Scenic River System; 0.5 million acres identified for exceptional primitive values; cultural features include northern part of Aleutian settlement; no known major recreation attraction; Togiak fishery.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented toward utilization.

KEY RESOURCE CONSIDERATIONS:

Major mineralized zone with known gold, mercury, and platinum deposits. Area contains only platinum producing mine in the U.S. Wildlife habitat.

KEY CONFLICTS:

Possible conflict of mineral production with cold water fisheries and potential Wild or Scenic rivers.

ACCESS:

Primary access by air. Long-range plans indicate eventual highway access into area.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 17

4.4 MILLION ACRES

RESOURCE VALUES:

Grazing	Potential for reindeer grazing. Some historical use.
Timber	None.
Land	Two native village selections; one potential hydro powersite.
Mineral	Minor possible petroleum province; no coal; mineralization unknown.
Water	Restricted supplies of good quality ground water. Exploration necessary; wells moderately deep. Surface waters of good to excellent quality; supply restricted in winter.
Habitat	Five percent of area waterfowl nesting; 100% area cold water fishery.
Recreation	Two river segments under study for possible inclusion in Wild and Scenic River System; two million acres identified with exceptional scenic values, and one million acres with exceptional primitive values; Aleutian settlement cultural feature; Wood River-Tikchik Lakes, high quality fishery streams.

PREDOMINANT LAND USE SUITABILITY:

Area oriented toward utilization and conservation.

KEY RESOURCE CONSIDERATIONS:

Possible minor petroleum province; important cold water and anadromous fishery production; excellent recreation values (scenic, primitive, cultural).

KEY CONFLICTS:

No major conflicts anticipated. Exploration for and development of oil and/or gas reserves may have potential for conflict with fishery resources.

ACCESS:

Access primarily by air. Long-range highway plans indicate eventual tie-up with existing road net.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 19
RESOURCE VALUES:

4.1 MILLION ACRES

Grazing	Potential for reindeer grazing. Some historical use.
Timber	None.
Land	Five native village selections; Katmai NM; Iliamna classification; 3 potential hydro powersites.
Mineral	Fifteen percent in possible petroleum province; no coal; 70% mineralized--key types iron and copper.
Water	Largely restricted supplies of good quality ground water. Exploration necessary, wells moderately deep. Surface waters range from silt laden along the coast to excellent quality in the Lake Iliamna watershed. Supply restricted in winter.
Habitat	Seventeen percent cold water fishery; moose concentration; grizzly/brown bear; anadromous fishery.
Recreation	One river segment under study for possible inclusion in Wild and Scenic River System; two million acres identified with exceptional scenic values, and 0.5 million with exceptional primitive values; part of early exploration settlement cultural features; known major attractions include Iliamna Lake, and small corner of Katmai NM. McNeil River state bear refuge, major sports fishery.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards utilization and conservation.

KEY RESOURCE CONSIDERATIONS:

Area contributes average of 2/3 of Bristol Bay red salmon fishery, largest in the world; possible petroleum province; known mineralization zone; exceptional recreational values.

KEY CONFLICTS:

Production of minerals and/or oil and gas could conflict with the anadromous and cold water fisheries and with the exceptional recreation values. Management emphasis should be on proper watershed management.

ACCESS:

Primary access by air, limited road net. Short-range plans indicate a ferry-highway hookup with the present existing highway net. Long-range plans indicate direct highway hookup to present highway net.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 20

7.2 MILLION ACRES

RESOURCE VALUES:

Grazing	None.
Timber	None.
Land	No village selections; Iliamna classification; Kenai Borough; Matanuska-Susitna Borough; one powersite withdrawal.
Mineral	No petroleum province; no coal; 10% mineralized--key type copper.
Water	Generally restricted to locally plentiful supplies of good quality ground water. Exploration generally necessary, wells moderately deep. Surface waters generally heavily silt laden, clearing in winter, but of limited supply.
Habitat	Five percent of area cold water fishery; Dall sheep range, and caribou calving area for Nondalton herd.
Recreation	Five million acres identified for exceptional scenic values, and 5 million acres for exceptional primitive values; Iditarod Trail and part of early exploration settlement cultural features; Mt. Redoubt; Anchorage; 50% of unit in 120-mile radius influence zone of Anchorage; borders SW area of McKinley NP.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards conservation.

KEY RESOURCE CONSIDERATIONS:

Mineralized area, wildlife habitat, exceptional recreational values.

KEY CONFLICTS:

Mineral production vs. wildlife habitat and exceptional recreation values.

ACCESS:

Primarily by air. Long-range plans include development of highway tie to present network.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 21

8.8 MILLION ACRES

RESOURCE VALUES:

Grazing	None.
Timber	None.
Land	One native village selection; Mt. McKinley National Park; 10 potential hydro powersites; powersite withdrawal; Eklutna IR; Ft. Richardson-Eielson MR; Matanuska-Susitna Borough; Anchorage Borough.
Mineral	Ten percent in possible petroleum province; small amount of higher grade coal; 20% mineralized with gold, copper, lead, zinc produced.
Water	Generally restricted supplies of good quality ground water. Exploration necessary, wells moderately deep. Surface waters mostly heavily silt laden, clearing in winter but of restricted supply.
Habitat	Ten percent cold water fishery; some moose concentrations; Talkeetna and Chugach Dall sheep herd; calving area for Nelchina caribou herd, and winter range and calving area for McKinley herd.
Recreation	Five million acres identified with exceptional scenic values, and 1.5 million acres with exceptional primitive values; Kantishna mining district, Colorado mining district; Stampede Trail; Mt. McKinley National Park, and Talkeetna Mountains; three major road systems; 50% of area within 120-mile radius of Anchorage; 40-mile radius influence zone of Anchorage touches unit; sport harvesting of Nelchina caribou herd.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards conservation.

KEY RESOURCE CONSIDERATIONS:

Recreation values, wildlife habitat, possible mineral production.

KEY CONFLICTS:

Land or resource utilization, mineral production may conflict with recreation values, wildlife habitat.

ACCESS:

Present access by road, rail, and air.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 22

2.2 MILLION ACRES

RESOURCE VALUES:

Grazing	Some potential for reindeer grazing.
Timber	None.
Land	No village selection; one potential hydro powersite; part of military reserve.
Mineral	No petroleum province; small low grade coal-producing; mineralization unknown.
Water	Generally restricted supplies of good quality ground water. Exploration necessary, wells moderately deep. Surface waters heavily silt laden, clearing in winter but of restricted supply.
Habitat	Bison; Dall sheep; and calving and winter range for delta caribou herd.
Recreation	2.2 million acres identified with exceptional scenic values; one million acres identified with exceptional primitive values. Cultural features include Stampede Trail and Valdez-Fairbanks Trail; entire unit within 120-mile radius influence zone of Fairbanks.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented toward protection.

KEY RESOURCE CONSIDERATIONS:

Exceptional recreation values, wildlife habitat, coal production.

KEY CONFLICTS:

Land and resource utilization, coal production may conflict with recreation values and wildlife habitat.

ACCESS:

Area accessible in part from 2 highways; air access.

RESOURCE MANAGEMENT OPPORTUNITIES

- SALIENT FEATURES -

MANAGEABLE UNIT NO. 23

14.7 MILLION ACRES

RESOURCE VALUES:

Grazing	Potential for reindeer grazing, existing horse leases.
Timber	Copper River timber.
Land	Eight native village selections; 2 potential hydro powersites; powersite withdrawal; utility corridor; Tetlin IN.
Mineral	Twenty percent in possible petroleum province; no coal; 20% mineralized; producing copper and silver.
Water	Poor quality ground water in Glennallen area, remainder of area has restricted supplies of good quality ground water except near major drainages where supplies are plentiful. Exploration generally necessary, well depth variable from shallow to deep. Surface waters generally heavily silt laden except for waters originating locally from the Copper River Plateau. Restricted winter supply.
Habitat	Fifteen percent waterfowl nesting area; 25% cold water fishery; anadromous fishery; concentration area for raptors along major drainage; winter range and calving areas for Nabesna, Mentasta, and Nelchina caribou herds; primary caribou migration route; goat, Dall sheep, moose concentration.
Recreation	Four river segments under study for possible inclusion in the Wild and Scenic River System; 5 million acres identified with exceptional scenic values; 2.5 million with exceptional primitive values; contains cultural features such as Valdez-Fairbanks Trail, Valdez-Eagle Trail, Tangle Lakes archeological district; Lake Louise complex; Copper NW Railroad; Kennecott mining district; early exploration/settlement; Chitina Valley; barely within 120-mile radius influence zones of both Fairbanks and Anchorage; Dall sheep trophy hunting.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented toward utilization and conservation.

KEY RESOURCE CONSIDERATIONS:

Timber, mineral production, possible petroleum, recreation values, wildlife habitat.

KEY CONFLICTS:

Production of timber, minerals, oil and gas may conflict with recreation, primitive, and scenic values, and wildlife habitat.

ACCESS:

Excellent highway and air access. Short-range plans indicate completion of road in Chitina Valley within next several years, highway tie to Cordova within 5 years.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 24

2.2 MILLION ACRES

RESOURCE VALUES:

Grazing	Potential for reindeer grazing.
Timber	None.
Land	None.
Mineral	No petroleum province; no coal; mineralization unknown.
Water	Generally restricted supplies of good quality ground water. Surface water heavily silt laden.
Habitat	Fringe of Dall sheep and caribou range; goat; bear; moose.
Recreation	1.5 million acres identified with exceptional scenic values; 1.0 million acres with exceptional scenic values; 1.0 million acres with exceptional primitive values; features include Mts. Wrangell, Sanford, and Drum; known major recreation attractions include Mts. Wrangell, Sanford, and Drum.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented toward protection.

KEY RESOURCE CONSIDERATIONS:

Exceptional scenic and primitive recreation values, limited, if any, resource production capabilities.

KEY CONFLICTS:

Significant scenic and primitive values dominate the area. No conflicts anticipated.

ACCESS:

Limited access by road along fringe of unit; air access primarily. No plans for further road expansion in area.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 25

8.8 MILLION ACRES

RESOURCE VALUES:

Grazing	None.
Timber	Contains some of coastal timber type.
Land	No native village selection; 5 potential hydro powersites; utility corridor.
Mineral	Thirty percent in proven petroleum province; small amount of higher grade coal (Bering field); mineralization unknown.
Water	Generally restricted supplies of good quality ground water except along Copper River and along coast where supplies are plentiful. Surface waters variable from clear to silt laden.
Habitat	Goat; grizzly bear; moose; glacier bear; Dall sheep, easternmost fringe of Chugach sheep range.
Recreation	Two river segments under study for possible inclusion in Wild and Scenic River System; five million acres identified with exceptional scenic values; two million acres with exceptional primitive values; cultural features include early exploration/settlement; Copper River NW Railroad; Kennecott mining district; Eagle-Valdez Trail. Natural features include Malaspina Glacier, Yakutat Bay, Bagley Ice Field, Copper River Canyon; known major attraction places unit within 120-mile radius influence zone of Anchorage.

PREDOMINANT LAND USE SUITABILITY:

Area oriented toward conservation and protection.

KEY RESOURCE CONSIDERATIONS:

Proven petroleum province, high grade coal, exceptional scenic and primitive recreation values.

KEY CONFLICTS:

Possible minor conflicts between oil and gas production and the scenic and primitive values and wildlife habitat.

ACCESS:

Highway access to Valdez, other access primarily by air; some local boat traffic. Short-range plans call for highway tie from Cordova to existing highway net through the unit.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 26

12.0 MILLION ACRES

RESOURCE VALUES:

Grazing	Some potential domestic livestock grazing in foothill areas.
Timber	Contains both interior and coastal commercial timber types encompassing approximately two million acres.
Land	Five native village selections; Kenai NMR; Kenai Borough; 8 potential hydro powersites.
Mineral	Seventy percent in known petroleum province; 20% of area low grade coal; mineralization unknown--some gold produced.
Water	Plentiful supplies of good quality ground water along major rivers and tributaries, restricted supplies in remainder. Exploration generally necessary, wells shallow to moderately deep. Surface waters originating in area generally of good quality, others silt laden. Supplies restricted in winter.
Habitat	Twenty-five percent waterfowl; 35% cold water fishery; moose; brown/grizzly bear; goat; Dall sheep; anadromous fishery.
Recreation	One million acres identified with exceptional scenic values; one million acres identified with exceptional primitive values; cultural values include Iditarod Trail and early exploratory settlement; Chugach, Nancy Lake, and Kachemak State Parks, Kenai Peninsula, Halibut Cove Natural Area, and proposed Seward National Recreation Area almost entirely within 120-mile radius, and much within 40-mile radius influence zones of Anchorage.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented toward utilization.

KEY RESOURCE CONSIDERATIONS:

Proven oil and gas production, minor gold production history, extensive low grade coal deposits with history of production, wildlife habitat, recreation values, timber.

KEY CONFLICTS:

Emphasis on meeting recreation needs of Anchorage area may conflict with oil and gas production, timber, and other land and resource utilization.

ACCESS:

Excellent access by highway, local roads, railroad, and by air. Extensive additions to present road network planned over both short- and long-term.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 27

14.4 MILLION ACRES

RESOURCE VALUES:

Grazing	Potential for reindeer and domestic livestock grazing.
Timber	None.
Land	Fourteen native village selections; Katmai NM; Izembeck NWR; one potential hydro powersite; part in Bristol Bay Borough.
Mineral	Seventy-five percent in possible petroleum province; small area of higher grade coal; mineralization unknown--key type gold.
Water	Ground water supplies of good quality generally restricted except along coastal lowlands on the peninsula where plentiful supplies can be found. Surface waters of fair to good quality, with glacial streams silt laden.
Habitat	Fifty percent waterfowl; 30% cold water fishery; anadromous fishery; winter range and calving areas for peninsula caribou herd; migration route up and down peninsula; moose concentration; brown/grizzly bear concentration and critical denning areas for bear.
Recreation	Two segments under study for possible inclusion in the Wild and Scenic Rivers System: two million acres identified with exceptional scenic values; cultural features include Aleutian settlement, early exploratory settlement; known major attractions include Katmai NM, Izembeck NWR; high quality sports fishery, trophy bear and moose hunting.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards conservation.

KEY RESOURCE CONSIDERATIONS:

Possible petroleum province, grazing, wildlife habitat, recreation values.

KEY CONFLICTS:

With utilization of range resource by domestic livestock or reindeer, major conflicts could be expected with wildlife habitat, and wildlife production. Mineral or oil and gas production could conflict with recreation values and wildlife habitat.

ACCESS:

Primarily by air, some ocean traffic. No highways proposed on peninsula.

RESOURCE MANAGEMENT OPPORTUNITIES
- SALIENT FEATURES -

MANAGEABLE UNIT NO. 28

1.8 MILLION ACRES

RESOURCE VALUES:

Grazing	None.
Timber	Commercial coastal forest, mostly under Forest Service jurisdiction.
Land	One native village; Tongass NF.
Mineral	Thirty percent in possible petroleum province; no coal; mineralization unknown--key types copper, nickel.
Water	Plentiful supplies of good quality ground water along the coastal lowlands, restricted supplies in foothills and mountainous areas. Surface waters good to medium quality; glacial streams silt laden.
Habitat	Twenty-five percent waterfowl nesting; raptor concentration areas; moose, brown bear; especially critical range for glacier bear.
Recreation	One million acres identified with exceptional scenic values; early exploration settlement cultural feature; high quality sports fishery.

PREDOMINANT LAND USE SUITABILITY:

Bulk of area oriented towards conservation.

KEY RESOURCE CONSIDERATIONS:

Timber production, potential petroleum province, wildlife habitat, recreation values.

KEY CONFLICTS:

Possible conflict between timber harvest, oil and gas production, with wildlife habitat, especially glacier bear, and recreation values.

ACCESS:

Access primarily by air, some boat traffic. No plans at present for extending highway net to area.

ECONOMIC SUPPLEMENT

Introduction

In previous portions of this proposal, the land base with its resource values was systematically analyzed and the conclusion reached that there were roughly two categories of land in Alaska: that which could best be managed through a multiple use management concept, and that which may best be managed through a single use management scheme.

Of that which was identified as being suited for management by multiple use means, four manageable units which are of critical interest were identified. These manageable units are to be proposed as National Conservation Areas (NCA) managed under a multiple use system.

High Value Tangible and Energy Related Resources

It is the purpose of this Economic Supplement to discuss certain aspects of the natural resources in these four areas of critical interest.

The aspects of the natural resources to be discussed are high value tangible and energy related resources. Obviously, there is an overlap between these two definitions in that some high value tangible resources, such as oil and gas, are also energy related. If a high value tangible resource is energy related, the energy producing potential of that resource will be emphasized.

For the purpose of this supplement high value tangible and energy related resources are defined as commercial forest, locatable minerals, coal, oil and gas, geothermal energy, and hydro power.

There are other resource values in the areas being discussed that, while not of a tangible or energy related nature, have value. Resources such as scenery, recreation, and wildlife habitat have tremendous intrinsic values and it should not be construed that they are of less value than the more tangible resources. On the contrary, when both types of resources are abundant in a given area, the ability to extract or consume some resources, without the destruction or impairment of the other resources, is needed more than in areas less well endowed.

Resources and Multiple Use Management

The high value tangible resources are those that, historically, have attracted people and economic development to remote areas. It has also been the uncontrolled or poorly regulated development of these resources that has caused the greatest incidence of adverse environmental impact. However, the wise development of these resources is one of the key factors in the continued and necessary improvement and growth of the economy of Alaska and the rest of the United States. At present this is particularly true of some of the energy related resources, such as coal and oil and gas, that are in national focus due to the present and very real energy crisis. As it would be to the disadvantage of the majority to preclude the development of these resources by making them unavailable through a single use management scheme, their carefully controlled development, under multiple use management, is not only warranted but is necessary.

Multiple Use Management and Regional Planning

The manageable units identified in this study were established on the suitability of the physical area for multiple use management or limited use philosophy. That is,

the resources that comprised the physical makeup of the unit, and their growth or development potential and interrelationship, determined the boundaries of the unit and land ownership was not stressed.

In actual fact, most of the manageable units proposed as NCAs are characterized by fractionated ownership. This is especially true of the White Mountain/Fortymile proposed NCA.

In areas such as this, which are extremely wealthy in high value tangible and energy related resources, a regional planning approach to multiple use management is the most practical means of insuring that each of the land owners in the unit realizes the greatest economic return at the least given regional cost in terms of adverse environmental impacts, and other social or economic costs. For example, if access to resources was planned on a regional basis, the planning and possibly construction costs, would be prorated among the land owners who were members of the regional planning organization. This would enable small land owners to develop their resources more economically than if they attempted to shoulder all this burden themselves. The economies of scale, in terms of development costs, the cost of environmental impact mitigating measures, and social costs, to be realized through a regional planning approach to multiple use management, more than justify this method of joint land use planning and multiple use management.

A discussion of the principal high value tangible or energy related resources in each of the four proposed National Conservation Areas follows.

Economic values present in proposed National Conservation Areas

1. White Mountain/Fortymile proposed National Conservation Area.

There is an abundance of high value tangible and energy related resources present in this proposed NCA. Chief among these resources are:

Locatable Minerals

The White Mountain/Fortymile area is quite mineralized and the potential for development is moderate to high. Several important placer districts, such as Livengood, Circle, and Chicken, exist and the chief locatable minerals are gold, antimony, asbestos, nickel, and copper. However, much of the area is not geologically well-known in detail and the extent of mineralization may be greater than anticipated. This is borne out by recent discoveries of asbestos, copper, and silver. Were it not for the uncertainties of the ANCSA, mining of these recent discoveries would likely have begun.

Oil and Gas

The potential for the development of this critically important energy source is excellent in portions of the White Mountain/Fortymile area. The northern part of this proposed NCA is in a possible petroleum province as defined by the USGS and part of this area is a cenozoic basin in the Yukon Flats that was identified as having high potential for oil and gas development. There are also extensive areas of potential petroleum provinces, again as defined by USGS, in the southern and western portions of the area.

Due to the proximity of the proposed trans-Alaska pipeline, the development of oil and gas in this area would be of significance not only to nearby Fairbanks, but to the rest of the country as well.

Timber

The timber resources of this proposed NCA consist not only of white spruce, the predominant species, but hardwoods such as birch, aspen, and cottonwood as well. This commercial forest occurs mostly in the lowlands of the Yukon, Tanana, and

Nenana Rivers. While it may not be economically feasible to open the area strictly for the development of timber, if access were developed for the purpose of recreation, to develop oil and gas, minerals, or other resources, the timber in the area could be harvested.

Coal

Coal-bearing rocks are present in two distinct locations in the proposed NCA: in a narrow band along the northeastern boundary, and in large areas to the southwest and northwest of Fairbanks. As the energy crisis worsens, a heavier dependence on coal, particularly on a regional basis, could be a reality, and these known deposits may take on greater significance in the future. This dependence on coal in the Fairbanks region could occur rapidly but would most likely be only an interim measure as it relates to a long-term solution of energy needs.

Geothermal Energy Sources

There are several identified geothermal energy sources in the proposed NCA. Of mostly local or regional significance, these geothermal energy sources would be important as an energy source for the Fairbanks urban area. If the energy crisis worsens, and as the use of traditional fuels such as oil and gas becomes more difficult, geothermal energy sources could prove to be the most efficient energy source for semi-isolated areas such as Fairbanks. As this is a "clean" source of power, it will receive even more attention in inversion-prone areas such as rapidly growing Fairbanks.

Hydro Power Sites

There are six potential hydro power sites in the White Mountain/Fortymile proposed NCA.

Included is the Corps of Engineers' proposed Rampart Canyon Power Project on the Yukon River. This project, which when complete would have a total power producing capacity of over 6 million kilowatts, is international in scope and would provide power for all of Alaska and portions of western Canada. Like geothermal energy, hydro power is "clean" and is well suited to provide the energy needs of highly scenic areas such as those found in this proposed NCA.

Other hydro power sites of high local significance in the area are found along the Tanana River.

Figure 1, White Mountain/Fortymile Proposed National Conservation Area - High Value Tangible and Energy Related Resources, shows the distribution of the principal high value tangible and energy related resources in this proposed NCA.

FIG. 1 WHITE MOUNTAIN/FORTYMILE PROPOSED NCA

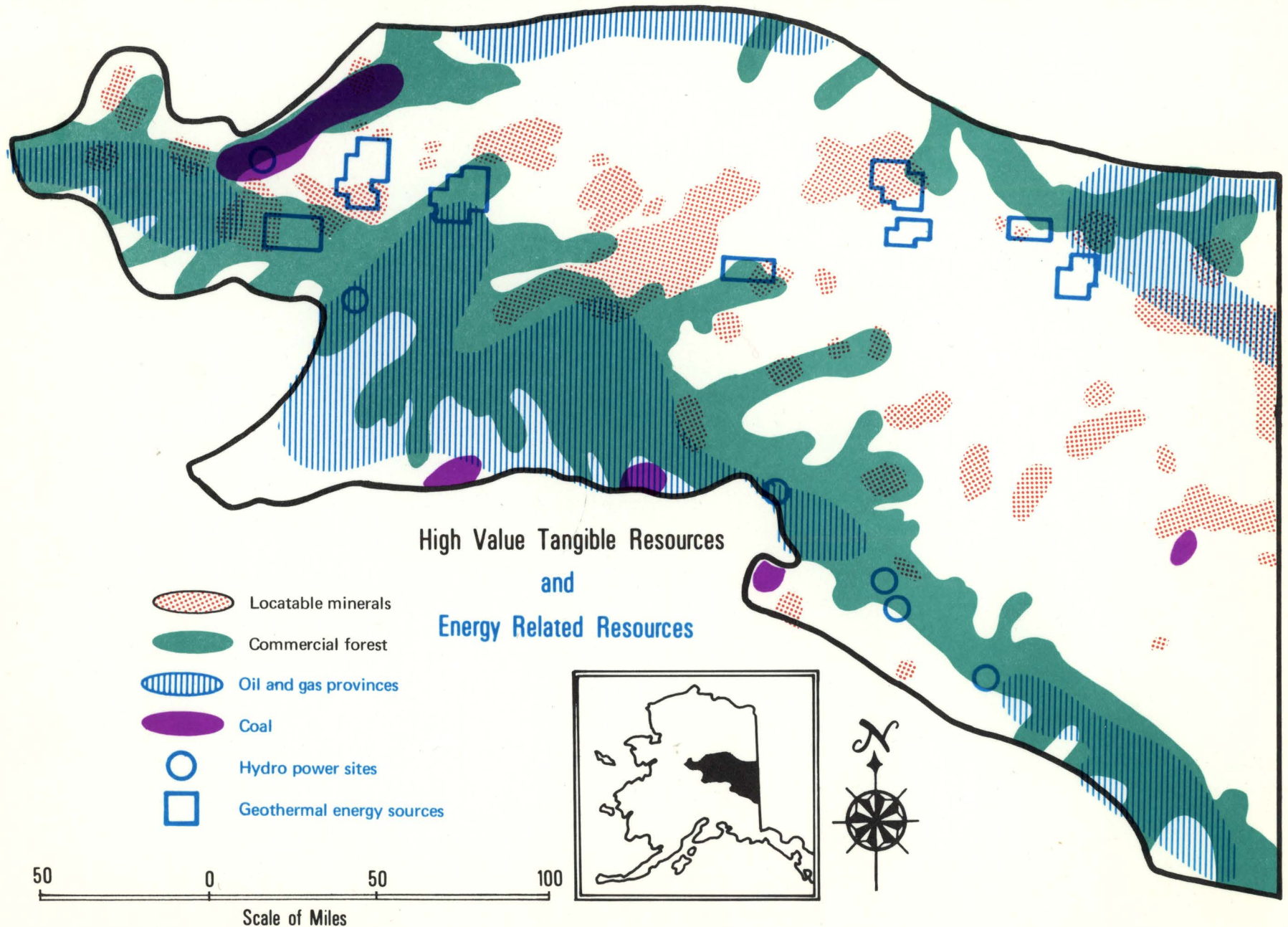
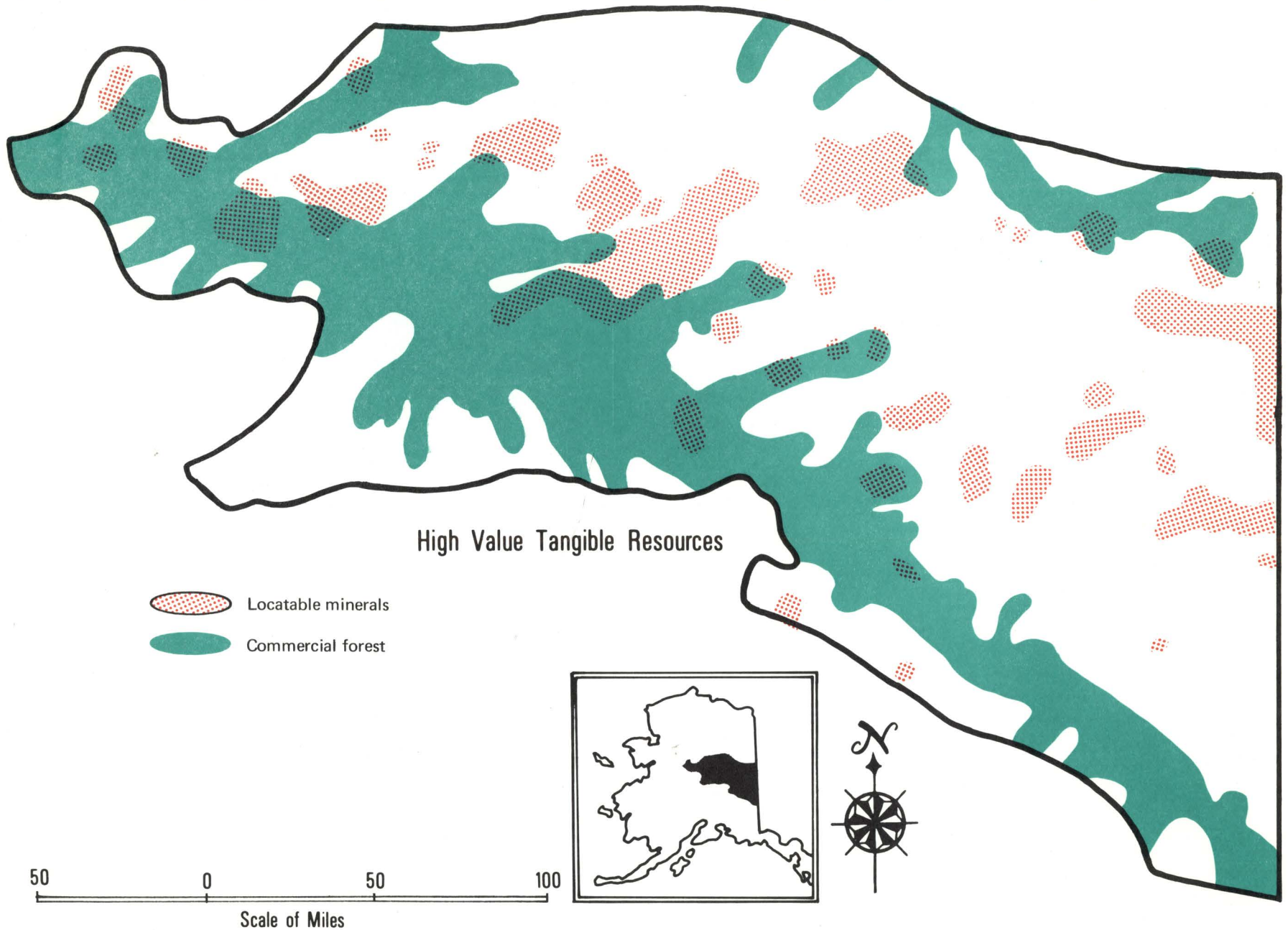


FIG. 1 WHITE MOUNTAIN/FORTYMILE PROPOSED NCA



2. Wrangell Mountains Proposed National Conservation Area

The primary high value tangible and energy related resources which occur in this proposed NCA are:

Locatable Minerals

Perhaps the most valuable tangible resource in this proposed NCA is locatable minerals. Fully 20% of the area is mineralized and is considered as having high potential for mineral development. Copper, silver, and gold are the principal mineral types which could be developed, and copper and silver are currently in production. While not all of the area has been geologically explored, most of it could be considered as being favorable to mineral development or similar to other areas that are favorable to mineral development. Several large companies and numerous independent miners and geologists share this opinion and are actively engaged in extensive geologic exploration of the area.

Oil and Gas

Roughly 20% of the Wrangell Mountains area lies within a possible petroleum province. There is no oil or gas production at present but the western portion of the unit is at the eastern terminus of the oil province that extends from the Alaska Peninsula northeastward through the Kenai Peninsula and Cook Inlet into the Wrangell Mountains. This area has been the subject of noticeable oil exploration in the past. The proximity of this province to the Anchorage urban area, to ice-free shipping lanes, and to the proposed trans-Alaska pipeline serves to reinforce the current and especially future potential of this valuable energy related resource.

Timber

The commercial timber, principally white spruce in the Copper River Valley, is of marginal significance when considered by itself. However, the commercial forest available in this proposed NCA could become locally significant in connection with the development of other resources such as oil and gas development or mining.

Geothermal Energy Sources

Based on geology and the occurrence of warm springs, virtually the entire western half of the Wrangell Mountains, plus smaller sites near Nabesna and Glennallen, is considered to be a potential source of geothermal energy. The use of a "clean" energy source such as this could be of high local significance as an acceptable power source for the mills and concentrators required by the mining industry. A regional geothermal power generating system located in this area could provide power for Valdez, Cordova, and even Anchorage plus the numerous smaller communities found along the Glenn Highway.

Hydro Power Sources

There are four identified hydro power sources in the Wrangell Mountains area and one of these, on the Copper River at Chitina, is an existing withdrawal. The scope of this proposed project would make power generated here of regional significance. Like geothermal energy, clean power sources such as this will gain increasing future significance as air quality standards are more rigidly enforced. The other three hydro power sites are on the Susitna River in the western part of the area. These sites could provide power which could be locally or regionally significant, especially if they were used as contributors to a regional power system.

Figure 2. Wrangell Mountains Proposed NCA - High Value Tangible and Energy Related Resources, shows the distribution of the principal high value tangible and energy related resources in this proposed NCA.

FIG. 2 WRANGELL MOUNTAINS PROPOSED NCA

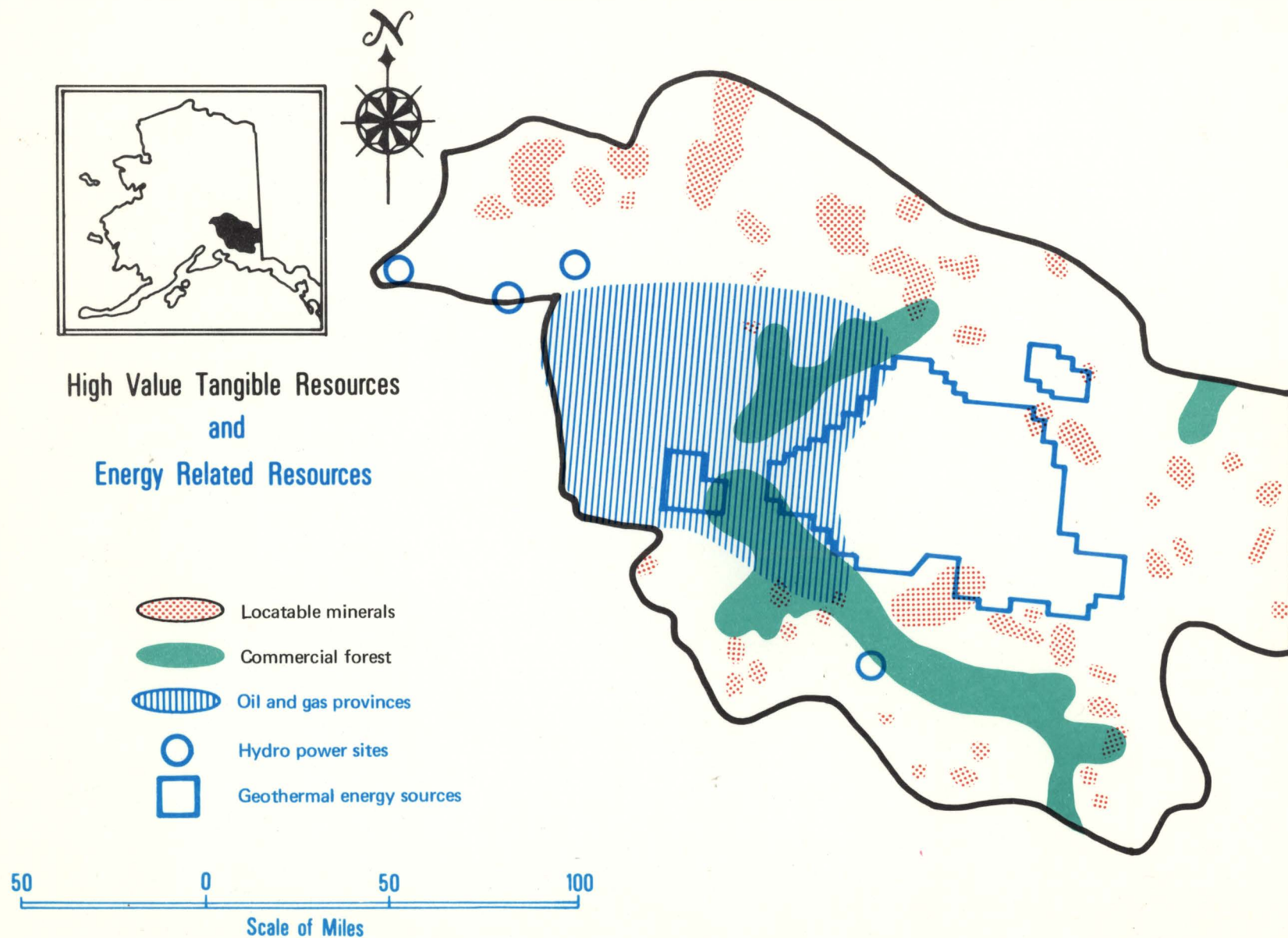
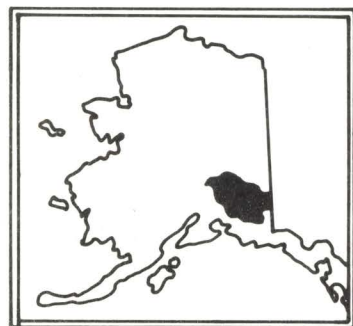
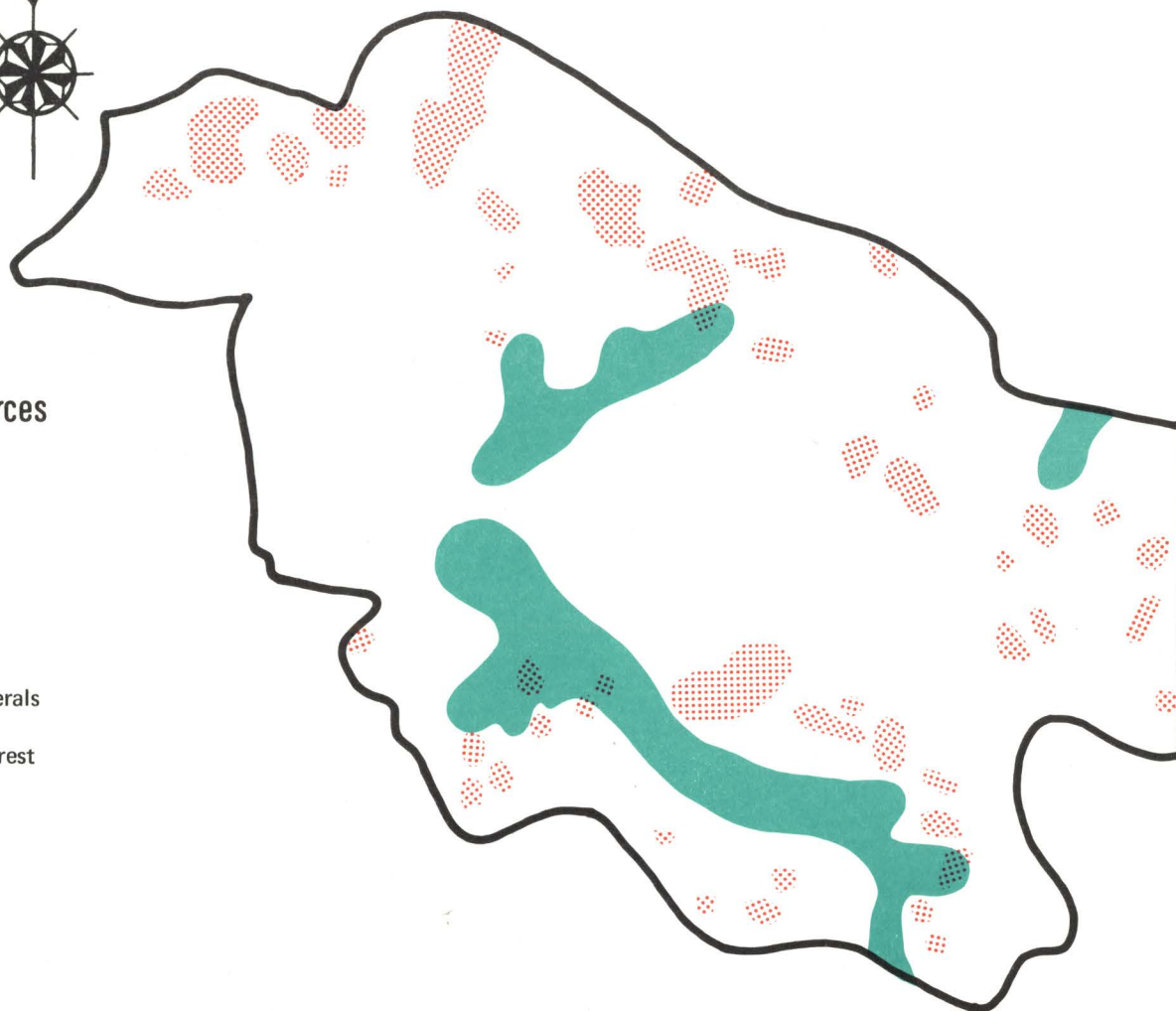


FIG. 2 WRANGELL MOUNTAINS PROPOSED NCA



High Value Tangible Resources

-  Locatable minerals
-  Commercial forest



3. Iliamna Proposed National Conservation Area

The primary high value tangible and energy related resources which occur in this proposed NCA are:

Locatable Minerals

Much of the Iliamna proposed NCA is mineralized; particularly the eastern portion where there are known occurrences of both iron and copper. There are vast deposits of low grade iron; however, knowledge of the extent of the copper will depend on more exploration. These two resources are located in an area that is adjacent to ice-free sea lanes and could be brought to market without serious handicaps due to isolation.

Based on the geology of the NCA and on other geochemical and geophysical data, there should be a high potential for mineral development throughout the area. Like most other areas of the state, however, little mineral exploration has been accomplished in the Iliamna region.

Timber

There is an occurrence of coastal commercial forest in the proposed NCA that consists of Sitka and white spruce. While not of economically developable quantity by itself, this commercial timber could be of regional importance if combined with the timber of the Kenai Peninsula-Cook Inlet area. The combined volume could support a regional mill capable of supplying the lumber needs of southcentral Alaska.

Oil and Gas

The Iliamna proposed NCA lies within the large petroleum province which covers much of the Alaska Peninsula-Kenai Peninsula-Cook Inlet area. This is the province that contains the producing Cook Inlet wells and which presents the fewest exploitation obstacles of any petroleum resource in the state. Oil and gas could prove to be one of the most important resources of this proposed NCA and could be of national importance. The potential that oil and gas have in this ice-free sea lane area is borne out by the fact that at least one major oil company is now drilling on the Alaska Peninsula.

Geothermal Energy Sources

The Iliamna proposed NCA lies adjacent to the Katmai National Monument, an area recognized by its pronounced vulcanism. Developing the geothermal energy sources existing in the Iliamna area could produce enough energy to satisfy the power needs, both domestic and industrial, of the entire Bristol Bay area. The high scenic and recreation values in this area may well require a clean energy source to maintain the existing air quality. Further, as other developments occur in the Iliamna area, a large reserve of surplus power would be necessary to mitigate the impact of future growth in sectors such as tourism, commercial fishing, oil and gas development.

Hydro Power Sources

There are three potential hydro power sites in the proposed NCA; however, none of these are of sufficient significance to warrant serious consideration at present. The principal obstacle to the development of hydro power in the Iliamna area is the potential for impairment to local cold water and anadromous fisheries.

Figure 3, Iliamna Proposed National Conservation Area - High Value
Tangible and Energy Related Resources, shows the
distribution of high value tangible and energy related
resources in this proposed NCA.

FIG. 3 ILIAMNA PROPOSED NCA

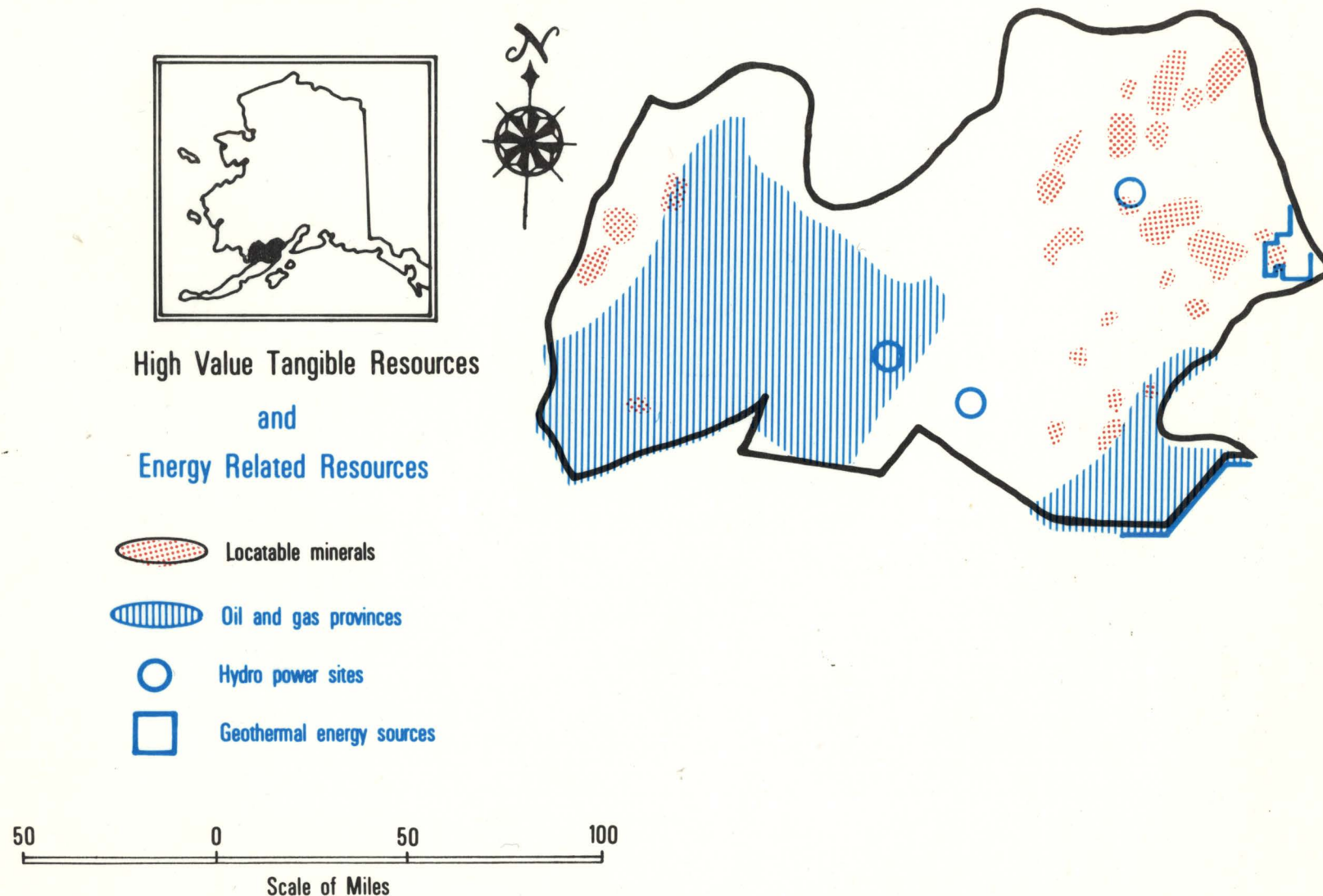
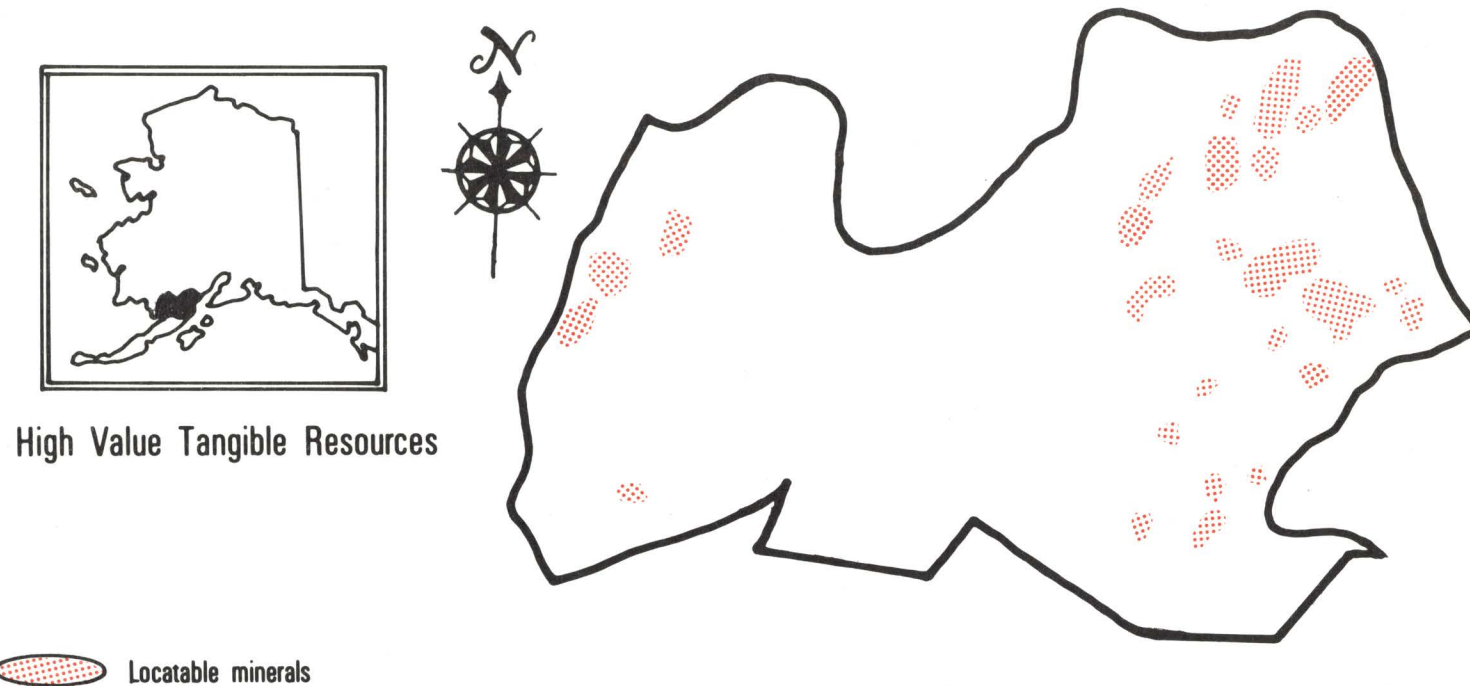


FIG. 3 ILIAMNA PROPOSED NCA



4. Noatak Proposed National Conservation Area

The primary high value tangible and energy related resources which occur in this proposed NCA are:

Locatable Minerals

The Noatak proposed NCA is like much of Alaska in that it is suspected of being rich in locatable minerals but, even today, remains largely geologically unexplored. However, the entire south slope of the Brooks Range is a known mineral zone and, based on geologic settings and existing geophysical data, well over half of the area appears to be mineralized with copper, gold, silver, and nickel being the principal types present. Noatak is an outstanding example of the type of area that could be quite rich in minerals but which could be excluded from mineral development by coming under a restrictive single use management scheme. Lack of detailed geologic data has been the principal deterrent to the development of the mineralization suspected of occurring in the area.

Oil and Gas

Some 30% of the Noatak unit lies within the petroleum province that extends from the Chukchi Sea to the Canadian border. This area, which comprises most of the land north of the Brooks Range, contains the Naval Petroleum Reserve No. 4 and the Prudhoe Bay fields to the east. While not adjacent to the proposed trans-Alaska pipeline, the Noatak area could prove a significant producer of this energy related resource. It could also be of high local or regional significance as an energy source for the Kotzebue Sound-Seward Peninsula area. Although little exploration has been done, the adjacent Naval Petroleum Reserve No. 4, which has been retained to provide energy in case of national need, is receiving

considerable current attention and bringing the existing petroleum reserves into production is being considered. A coordinated regional effort to develop the north slope petroleum resources could be highly beneficial to the Noatak proposed NCA.

Coal

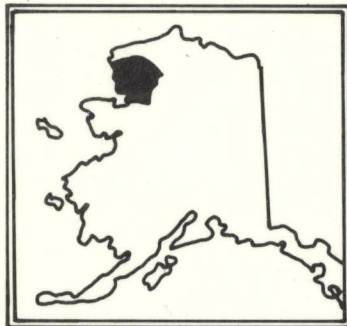
Low grade coal is found in some 30% of the Noatak proposed NCA. Realignment in the value or priority of the various energy related resources could force an upward reappraisal of the value of coal, particularly as it relates to the generation of local or regional power. Further, with the existing Oriental market for coal, a favorable balance of payments ratio could be aided by the exportation of large quantities of this resource.

Hydro Power Sources

There are four identified power sources in the Noatak area and one of these, the Agashashak project on the Noatak River, has the potential of 93,000 kilowatts of capacity. This could be of important regional significance to the Kuskokwim-Seward Peninsula area. Again, hydro power is a "clean" fuel and, as there are no geothermal energy sources in the area, would be the only source of power that possessed a low adverse environmental impact.

Figure 4, Noatak Proposed NCA - High Value Tangible and Energy Related Resources, shows the distribution of high value tangible and energy related resources in this proposed NCA.

FIG. 4 NOATAK PROPOSED NCA



High Value Tangible Resources
and
Energy Related Resources





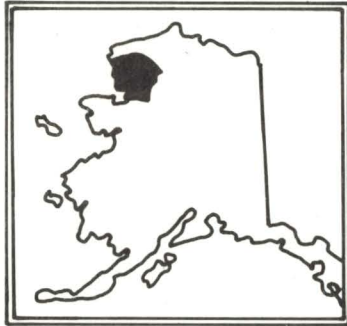
-  Locatable minerals
-  Oil and gas provinces
-  Hydro power sites
-  Coal



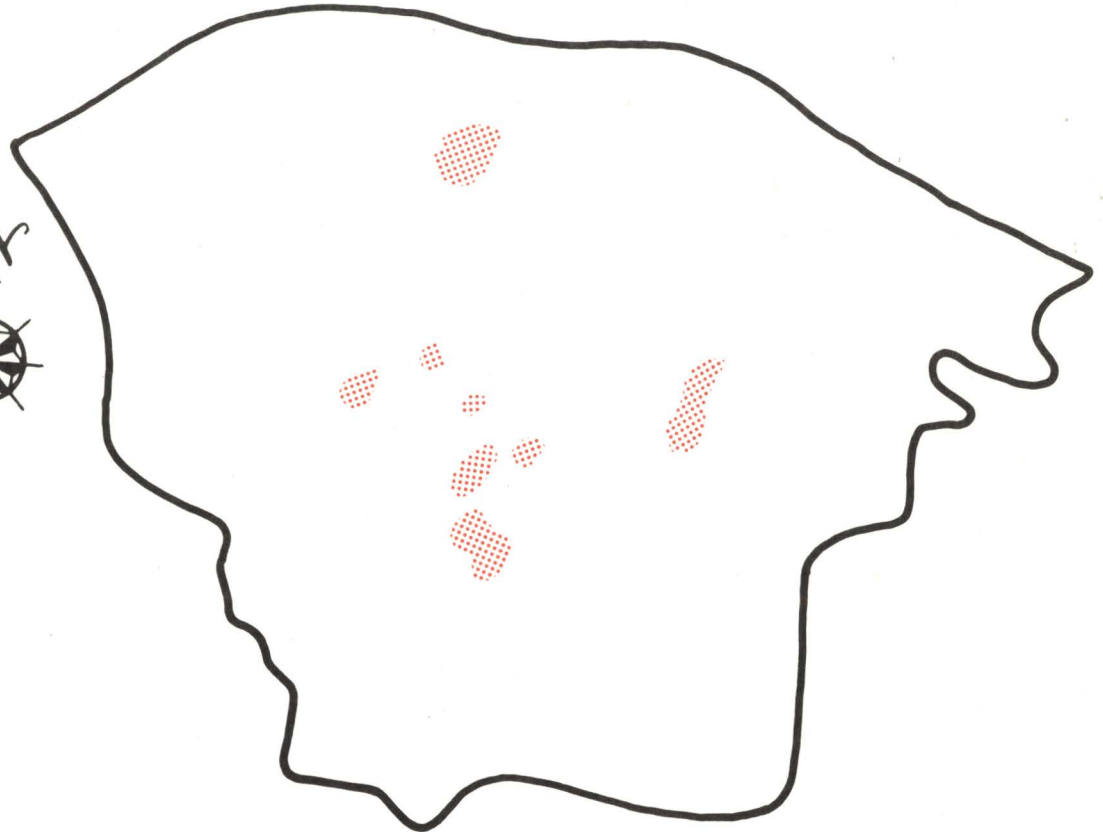
FIG. 4 NOATAK PROPOSED NCA



High Value Tangible Resources



Locatable minerals



C. Conclusions

From the data presented in earlier portions of this Proposal and from the information presented in the first two chapters of the Economic Supplement, several meaningful conclusions that relate to land management can be drawn. These conclusions are:

1. There are certain areas in the State of Alaska that, based on an in-depth analysis of the resource values present, are far better suited to management under a multiple use concept than under a single use concept.
2. In areas that have been identified as being best suited for multiple use management, there are four distinct areas of national interest that warrant their establishment as National Conservation Areas to be administered under a sophisticated multiple use management philosophy.
3. Within each of the proposed National Conservation Areas there are certain of the existing natural resources that, due to their high value or relation to the national energy crisis, deserve a management philosophy that will permit the orderly development of these critical resources.
4. When all factors are considered and when all management alternatives are weighed, multiple use management, administered ideally through a regional planning system, will provide the greatest number of benefits for the largest number of people at the least social, economic, and environmental cost.

LAND USE PLANNING
(CHITINA VALLEY PLANNING UNIT)

LAND USE PLANNING

bureau of land management

alaska



U. S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT



Land Use Planning

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THE PRESENT PATTERN of land ownership and jurisdiction in the United States of America is largely the result of historic trends rather than firm planning. The result has often been a haphazard intermingling of ownership and jurisdiction. In many cases, even today there is more emphasis on ownership than on wise use of the land which is owned. But America's Natural Resource Lands are not an inexhaustible natural resource.

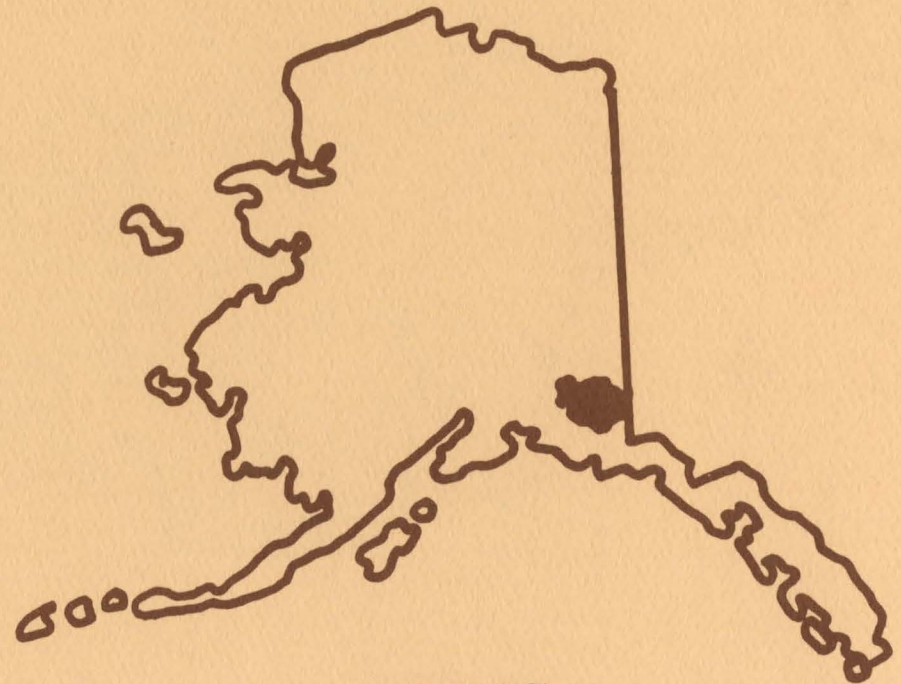
"THE ENVIRONMENT" has become an issue in recent years, as did "conservation" before it. Both ideas, stated another way, are that man cannot continue to consider only his own desires and needs: to use the land wisely, he must work within natural laws.

Alaska is more fortunate than many other states because much of the land is relatively untouched by man's influence. Alaska has vast contrasts in topography, land use capabilities, and land use limitations. All of these can be considered today, because land use planning is a reality. The desires, needs, and use pressures of man dictate which areas of Alaska are planned first.

THE PERFECT PLAN is impossible to produce; planning must be dynamic to provide for present and future public demands. One of the best planning systems in use today is the Bureau of Land Management (BLM) Planning System. This booklet discusses the "how-to" of BLM's land use planning.

ALASKA IS BIG, and someday there will be comprehensive land use plans for all of it. At present more is known about

some areas than others. One area about which much is known is the Chitina Valley. This booklet, used as a working tool, shows the steps to be followed when the BLM Planning System is applied to the Chitina Valley. The same multiple-use planning principles and methods are used from the deserts of Arizona to the Chitina Valley in Alaska. The Chitina Valley is located in south-east central Alaska, as shown by the outline map below.

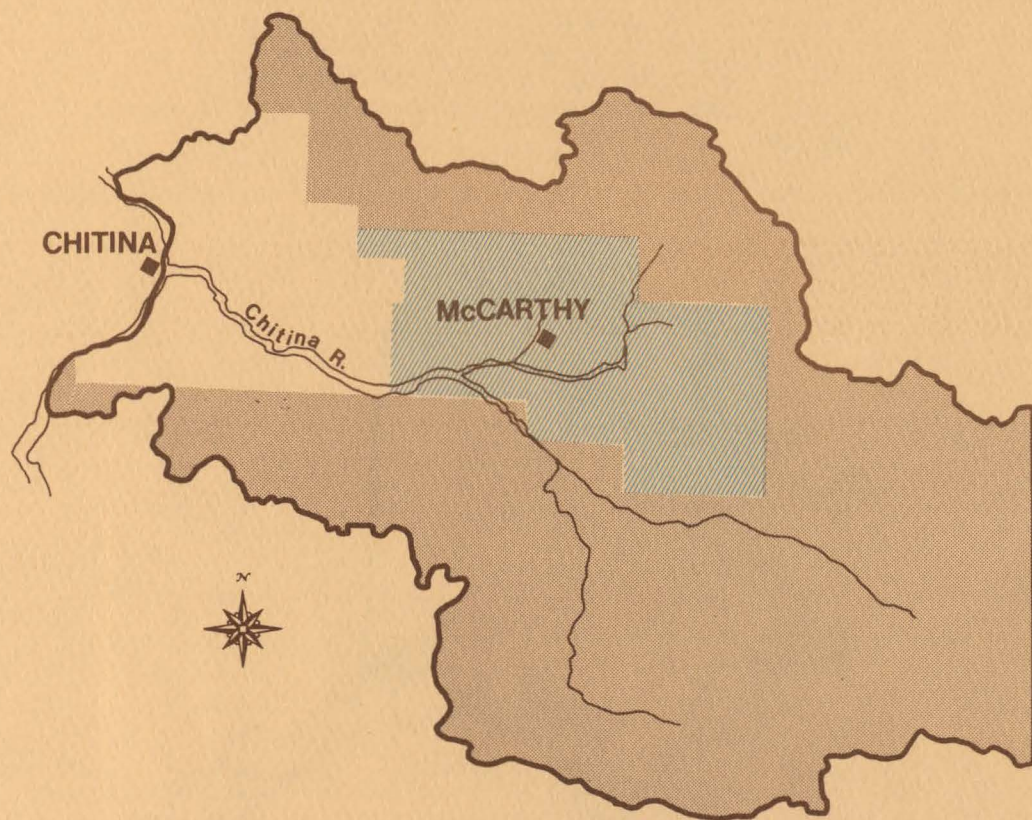


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Anchorage, Alaska 99513-7590

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Consider the Ecology of the Area



EARLY INTERIOR INDIANS were the first to use the area now known as the Chitina Valley. They used the Copper River as a route to the sea and as a means to contact the coastal Chugach Eskimos. Later, the white man discovered minerals in the area and introduced mining as a land use. Neither aboriginal use nor mining development was part of an overall land use plan; the concept had not been thought of yet.

INFORMATION GATHERING began in 1966 for a BLM planning effort in the Wrangell Mountains, on an area BLM called the Wrangell Mountains Planning Unit. In 1971 the Alaska Native Claims Settlement Act was passed, and in 1972 the land contained in the planning unit was placed into two categories, known as D-1 and D-2 withdrawals. These are also known, respectively, as public interest and national interest withdrawals. D-1 lands were withdrawn for study and review to determine what future management should be. D-2 lands were withdrawn for study for possible inclusion in National Forests, National Parks, Wildlife Refuges, and Wild and Scenic River Systems.

THE BOUNDARY BETWEEN D-1 AND D-2 lands, as shown on the Chitina Valley map, was drawn along straight lines, perhaps more suitable to the surveyors' legal description of the land than to an actual management boundary. Effective multiple-use planning requires consideration of ecosystems, resources, economics, and social factors. All of these have been included within an ecologically manageable unit; the BLM's Chitina Valley Planning Unit follows the boundaries of the Chitina Valley watershed.

BLM'S PLANNING SYSTEM takes into consideration ecological inter-relationships, and also man's desires, needs, wants, and uses for land. While there are many ideas of what should—or should not—be planned in the D-1 and D-2 areas of the Chitina Valley, the BLM's planning system assigns no initial overall priority to any specific use or uses.

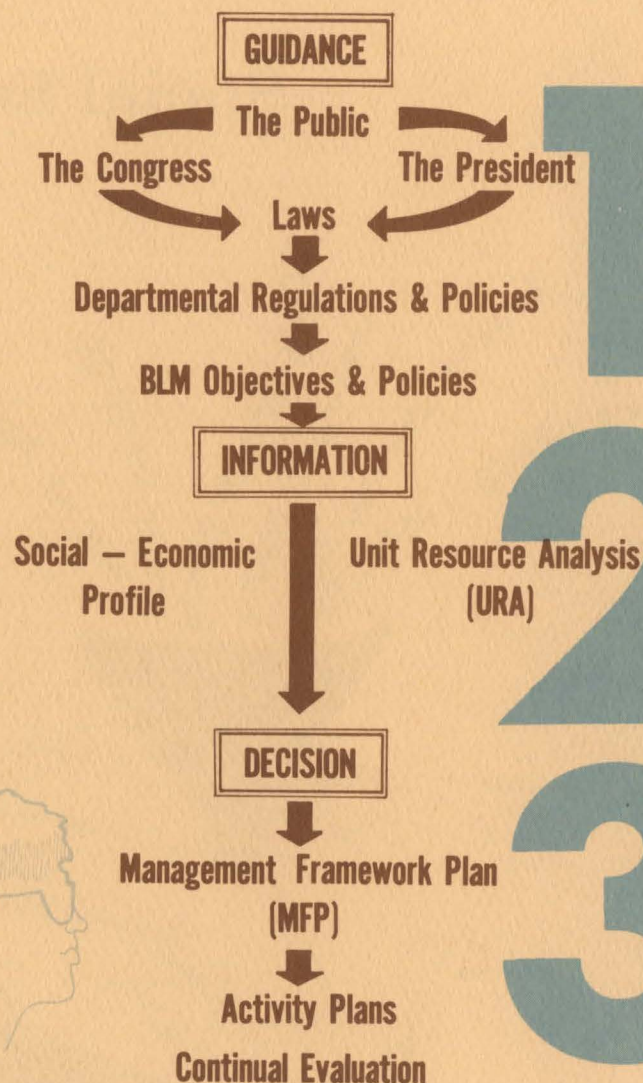
BLM Planning Summarized

BASIC GUIDANCE for BLM's Planning System is the public, who, through the Congress and the President, make their needs and desires known as "laws of the land." The U.S. Department of the Interior is guided or restricted by these laws when developing policies and regulations. In turn, these policies and regulations guide BLM in the establishment of its management objectives and policies. Other guidance includes assumptions for technological improvements, projections for economic growth, and social trends, to name a few.

ACTUAL PLANNING BEGINS with the gathering of detailed data directly or indirectly related to a specific geographic area called a Planning Unit. The data is an information base upon which interdisciplinary planning is undertaken, to identify and resolve land use and resource use conflicts. Decisions are made, then detailed development or action plans are prepared for each activity or resource program.

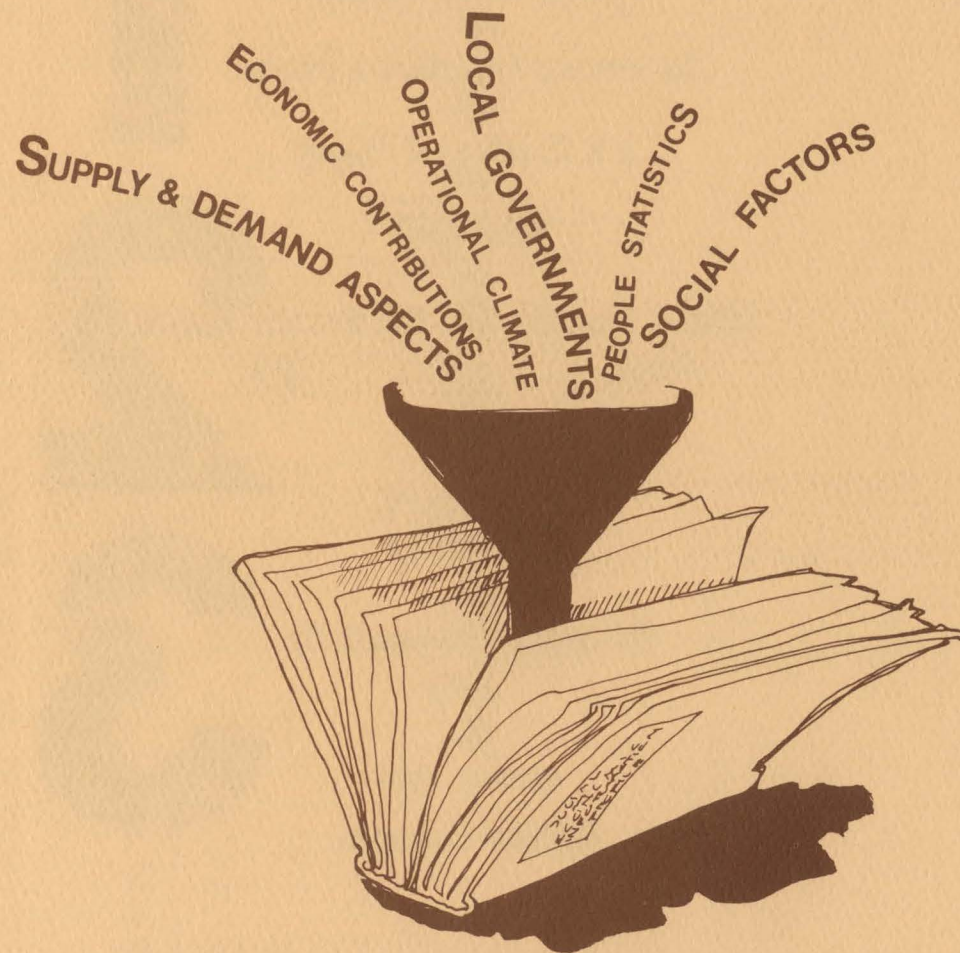
NEW DATA may appear at any time, and it may be necessary to back up and repeat all or part of a planning step, or a number of steps. Once the entire plan is approved it is subject to continual evaluation and updating. Internal review and public reaction are two elements of continual evaluation.

PUBLIC PARTICIPATION is not restricted to any single part of the BLM's Planning System. The public is involved throughout the planning process, through informal individual contacts, meetings, to formal public hearings. Much of the information for a planning unit is obtained from people who live in or are closely associated with the land and its resources. Later, these same people have the opportunity to examine alternatives for management of the planning unit and to help decide what future management should be.



The three main components of the planning process are Guidance, Information, and Decision, along with the action and evaluation aspects of BLM's Planning System. The remainder of this booklet will discuss in detail the Information and Decision-making elements of BLM's Planning System, using the Chitina Valley Planning Unit as an example.

Social-Economic Profile



HUMAN NEEDS DEFINE RESOURCES. The early Indians had no way to use the minerals so eagerly sought by the white man; what may have been merely pretty rock to the Indian was a valuable mineral discovery to the white man. In land-use planning, other factors must be considered than just those which relate to resource supply and demand. How is the land used, and who is affected by the use?

SOCIAL AND ECONOMIC NEEDS are part of the "operational climate" in which the BLM does business. Since planning for land-use implies planning for people-uses, "people characteristics" must be considered. For example, what is the impact of national resource land resources on local business? Does this contribute substantially to the local economy? What is the effect of existing cooperative relationships between agencies, local governments and land users? What "people needs" can be satisfied with the land's resources? Are statistics available to help document these needs and their impact on the land's resources?

THE SOCIAL-ECONOMIC PROFILE asks these and other questions. The answers help to identify and support the types of resource use and degree of management needed in the Chitina Valley Planning Unit. The profile helps identify major problems concerning economics, resources, social factors, and ecosystems. The coordination needed with others to resolve these problems and similar general information is identified by the Social-Economic Profile.

Unit Resource Analysis (URA)

THE PHYSICAL RESOURCES INVENTORY portion of the Information component of the planning system is called the "Unit Resource Analysis." It is an inventory and analysis of the resources in the Chitina Valley Planning Unit. The Unit Resource Analysis, or URA, describes and analyzes the current production, problems, use, condition, and trend data of record for all natural resources within the planning unit. The URA identifies capabilities and opportunities to increase production and use, or to improve conditions through development. The information in the URA is available for various planning processes, particularly environmental assessments, in BLM's planning system.

THE URA IS NOT A PLAN. It is an information bank where data about the land and its resources is accumulated for analysis and use. Much information exists, but in the past this information has been found in many places and often in forms unsuitable for use in planning. The URA information bank eliminates this shortcoming for a specific planning unit by providing a source of readily accessible information once data has been collected.

URA's Four steps:

1. Base Map
2. Physical Profile
3. Present Situation
4. Resource Potentials

URA Step One:

THE FIRST STEP of the Unit Resource Analysis is the development of a suitable Base Map. The map at the right shows the Wrangell Mountains Planning Unit, of which the Chitina Valley is a part. For illustrative purposes, this booklet applies the BLM Planning System to the Chitina Valley Planning Unit. The Base Map of the Chitina Valley Planning Unit shows the location of private and national resource lands, roads, towns, major improvements, and rivers.

THE HEART OF THE PLANNING SYSTEM is the practice of relating information on physical land and mineral resources directly to actual physical locations within the planning unit. Information of this type is tied to some resource on the ground, whose physical location is exactly known. This data is assembled both in narrative form and on transparent sheets called "overlays." When placed over the Base Map, the overlays show the distribution of physical and biological resources in the Chitina Planning Unit.

PLANNING UNITS whose boundaries are based on resources, ecosystems, economics and social factors are generally large enough with boundaries significant enough to include most inter-relationships within the planning unit. These planning units are, in a word, manageable units. However, inter-unit and outside influences, such as wildlife migration, may require coordination and appropriate references.

The Base Map

STEP
1

B
A
S
E

M
A
P



URA Step Two:

THE SECOND STEP of the Unit Resource Analysis is the Physical Profile. It assembles data on climate, topography, hydrology, vegetation, soils, and geology. This analysis covers all lands in the Chitina Valley Planning Unit, regardless of land ownership or jurisdiction.

CLIMATE data includes information on precipitation, temperatures, wind, frost-free growing season, and the limiting effects of climate.

TOPOGRAPHY data includes general relief of the planning unit, mountain and valley structure, elevational differences, drainage patterns, and general gradients.

HYDROLOGY data includes all water resources in the planning unit: the location of live streams, springs, reservoirs, wells, and the extent of ground water supplies if known.

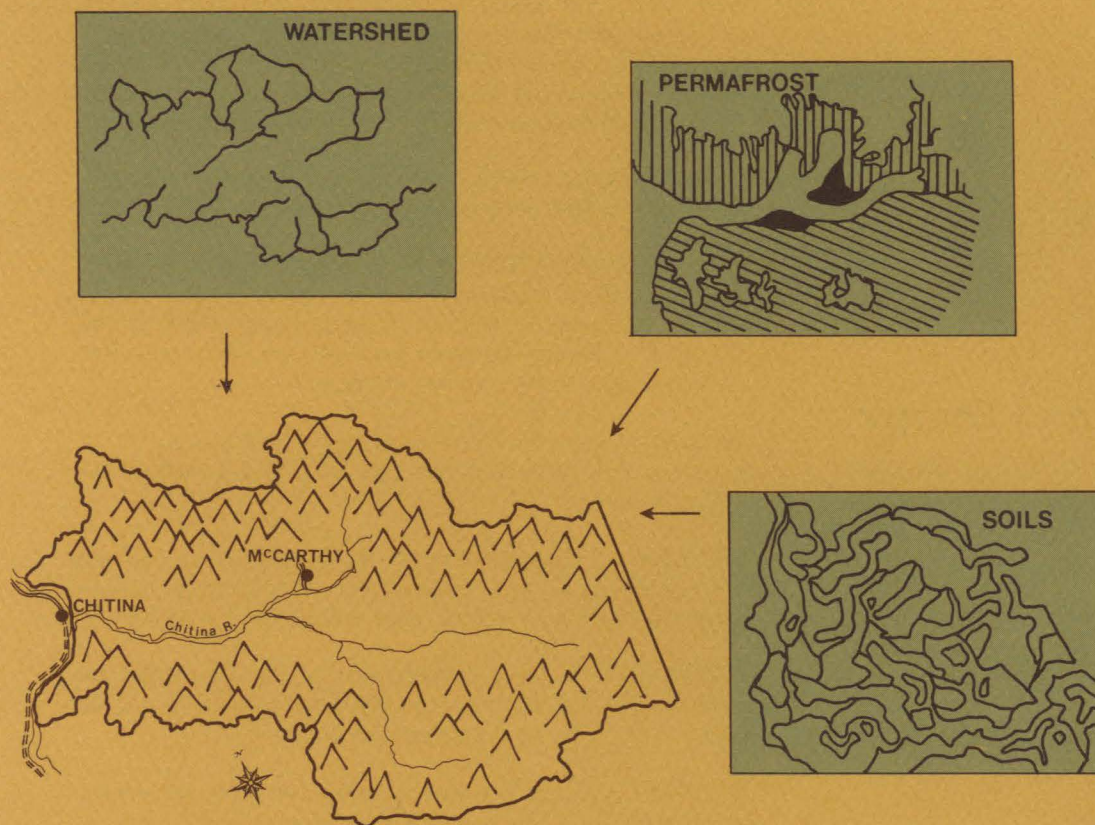
VEGETATION data includes the major types of vegetation in the planning unit, the extent of coverage, and locations. Variations due to elevational differences or exposure are described.

SOILS data includes soil associations, and—to the extent it is available—such information as parent material, depth, fertility, texture, structure, ease of revegetation, and erodability.

GEOLOGY data is confined to the general surface characteristics of the planning unit, identifying those certain characteristics that may be of particular importance to the management of the planning unit.

SPECIAL INFORMATION may be required for planning units in Alaska. Information on permafrost, for example, does not fit well into any of the categories of the Physical Profile.

Physical Profile



THE CHITINA PLANNING UNIT

For purposes of illustration only three Physical Profile overlays are shown.

URA Step Three:

Resources Considered:

Lands

Minerals and Energy

Timber

Livestock Forage

Watershed

Wildlife Habitat

Recreation

THE THIRD STEP of the Unit Resource Analysis is an inventory of the resources of the area and man's activity. Enough information is needed to understand the significance, inter-relationships and problems in the Chitina Valley Planning Unit. An analysis and record is made of current use, problems, trends and production for each of seven resource categories.

LANDS includes current land use, land ownership, and lands actions which have occurred in the planning unit.

MINERALS AND ENERGY includes the location of mineral developments on privately owned or Federal lands, information on ownership of minerals in the planning unit, locations and types of mining claims on Federal lands, and information on oil and gas and other energy resources.

TIMBER includes the location and quantity of existing timber resources, and the amount and type of use being made of the timber resource.

LIVESTOCK FORAGE depicts the livestock grazing management situation in the planning unit. Domesticated reindeer grazing on national resource lands is considered if applicable.

WATERSHED includes a description of the watershed conditions, including erosion, watershed improvements, and problems and needs. In Alaska permafrost areas are shown.

WILDLIFE HABITAT considers species of big game, upland game, waterfowl, fish, rare and endangered wildlife, fur bearers, and non-game and other species whose habitat in the planning unit may require special management attention.

RECREATION includes such values as scenery, wildlife, cultural features, geologic features, water bodies, snow and ice where winter sports are feasible, ecological features, recreation sites, and primitive or wilderness areas.

The Present Situation

MINERALS AND ENERGY

Two minerals stand out above all others. These are copper and gold, and both have had a long history of development in the Chitina Valley area.

TIMBER

Both in quality and quantity, forest lands are directly related to the distance from stream valley floors.

LANDS

With the exception of two areas, the Chitina Valley Planning Unit has been classified for Federal retention for multiple-use management.

LIVESTOCK FORAGE

The most important classes of forage plants are native grasses, sedges, and forbs—used by pack horses on seven grazing leases.

WATERSHED

Eighty per cent of the unit is underlain by permafrost which in itself creates an erosion hazard.

WILDLIFE HABITAT

Moose are the most widespread big game animal, occupying all of the habitat at some time during the year, except for glaciers and very steep slopes above timberline.

RECREATION

There are several outstanding ecological communities and areas with primitive value or high scenic values.



URA Step Four:

THE FOURTH STEP of the Unit Resource Analysis is analysis of the capability or opportunities for development of each of the seven resource categories. Individual consideration is essential to learn the full capability and potential of each separate resource.

"TUNNEL VISION" or "no constraints" is the point of view used in URA Step Four to look at each resource. There is no concern for any multiple-use considerations other than those built into basic inventorying techniques in Step Two, the Physical Profile. Only technical constraints are imposed: the full potential must be technically feasible for management. Each resource is evaluated as if it were the only resource which exists in the Chitina Valley Planning Unit.

WHAT WOULD YOU PLAN if you had the money and time to do anything technically possible in the Chitina Valley Planning Unit? Although a total of at least seven resource specialists have made their plans, the separate plans of the Recreation specialist, the Minerals specialist, and the Watershed specialist are summarized on the next page. Their planning in Step Four of the URA is single-use planning, without economic restraints; it is not limited by the concept of multiple use management.

**... evaluating each resource
as if it were the only one
which exists ...**



Resource Potentials

Unrelated single-use plans, designed with "tunnel vision"

RECREATION

- Scenic corridor
- Primitive areas
- Areas for intensive recreation use
- Wild, Scenic, Recreational Rivers
- Off-Road Vehicle use areas
- Natural Research areas
- National Landmarks
- National Historic Sites

MINERALS

- Copper
- Gold
- Molybdenum
- Nickel
- Unlimited exploration and access
- Placer mining
- Mineral development

WATERSHED

- Restrict permafrost areas (80.7 per cent of the Chitina Valley Planning Unit) from any use resulting in vegetative damage or erosion
- Require proper watershed management in permafrost areas

Much has been learned about the Chitina Valley Planning Unit — but no decisions have been made on how the area will be managed.

Management Framework Plan (MFP)



THE MFP is a “general” and “multiple-use” plan designed to display how a given geographic area should be managed. As its name implies, it is a plan which sets up a framework for management. Basically the MFP involves a process designed to identify and reconcile land use and resource use conflicts.

IN A BROAD SENSE, the MFP does not “plan for” certain uses; that is, the plan is not initiated with the assumption that specific uses are the highest and best use of the land. Instead, planning proceeds without prior judgments, as objectively as possible. The land use or combination of uses which emerge are those which will best achieve the objectives of multiple-use. The widest range of beneficial uses is sought without undue environmental degradation, risk to health and safety, or other undesirable consequences. This includes optimum production of products and services from national resource lands in the Chitina Valley Planning Unit, consistent with acceptable environmental quality and preservation of natural values.

IN MFP STEP ONE, information from URA Step Four is used by each resource specialist to design a practical plan for his resource. As in URA Step Four, he uses tunnel vision to design a single-use plan, unaffected by multiple-use considerations. Unlike URA Step Four, this plan must include legal, economic, time and other constraints. The finished plan must be practical enough, that if accepted, it could be put into effect in the Chitina Valley Planning Unit. Lands, Minerals and Energy, Timber, Livestock Forage, Watershed, Wildlife Habitat and Recreation plans are designed by resource specialists in those fields in MFP Step One.

THE “ADVERSARY CONCEPT” is the basis of MFP Step Two. Each resource specialist has developed the best possible plan for his resource, and now the seven resource specialists sit down together and each advocates adoption of his plan. Conflicts, overlaps, inconsistencies and problems are noted and analyzed. The environment is considered in the MFP, although there is no single step called “The Environment.” Each situation calls for specific assessment of physical and biological factors analyzed in the Unit Resource Analysis.

THE MULTIPLE-USE PLANNERS in MFP Step Two can plan for no more production of products or services than the land is capable of producing; nor more land use or activities than the land can safely absorb. Alternative solutions to various conflicts, overlaps, problems and inconsistencies are identified and proposed. These alternatives, worked out by compromise among resource specialists representing seven resources, are called multiple-use recommendations.

NO DECISIONS YET, HOWEVER! The multiple-use recommendations for management are exactly that: recommendations. The active assistance and participation of the public has helped to identify resources, problems, and needs. Now public help is needed to determine which, if any, of the multiple-use recommendations is the best solution for multiple use management of the Chitina Valley Planning Unit.

EVERYBODY ISN'T HAPPY with the decisions announced by the BLM District Manager in MFP Step Three, because one person may believe one land use to be more important than another. While everyone has his own opinion, it is impossible to say "yes" to everyone. Multiple use management requires a careful combination of uses and activities on the same land area to best serve the public. A working compromise, rather than complete satisfaction, is a worthy goal.

DECISIONS made provide a set of broad objectives and constraints which guide and influence the management of the Chitina Valley Planning Unit. More detailed action and development plans for each resource activity are then developed with the MFP serving as a guide. These plans are called activity plans. Land users are consulted as these plans are developed. The plans are translated into action programs when funds are appropriated; this involves the Department of the Interior, the Bureau of the Budget, the President, and Congress. This is the point where BLM's program becomes very specific to the many users and interests involved. Both BLM and the public will evaluate the results of programs to see if the plans are working and what changes, if any, would be desirable.

THE REMAINDER OF THIS BOOKLET discusses MFP Steps One, Two and Three, using examples to show how they are applied to the Chitina Valley Planning Unit. Only the Recreation, Minerals and Watershed resources are considered, to better illustrate the planning process. In actual practice, all resources would have to be simultaneously considered.

Steps in an MFP:

Step One: Activity Recommendations

Step Two: Multiple-Use Recommendations

Step Three: Decisions

MFP Step One:

Activity Recommendations

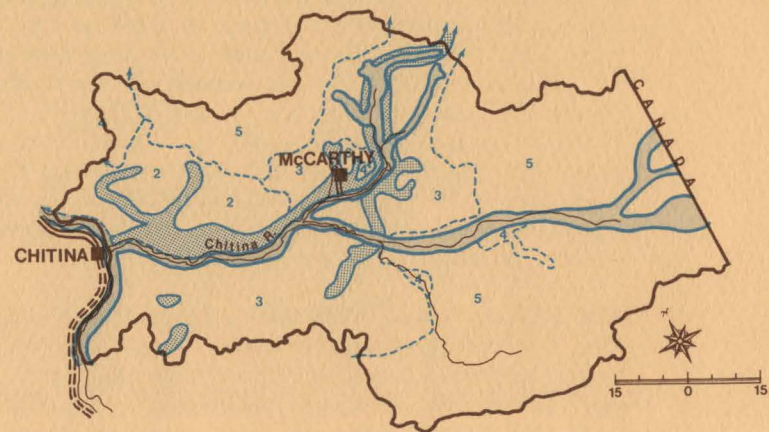
WHAT WOULD BE BEST for each resource? Three of the seven independent resource plans developed in MFP Step One are shown here. Beneath each is a Base Map of the Chitina Valley Planning Unit; information in the plan relates directly to actual physical locations depicted on the map. In actual practice, plans, maps and overlays are much more complicated than this admittedly much-simplified example.



RECREATION

Recreation Activity Recommendations are planning unit-wide:

1. Evaluate existing studies of off-road vehicle effects.
2. Open only specified areas to off-road vehicle use and horse access with specific plans which include enforcement provisions.
3. Provide a public-use cabins system.
4. Locate, inventory and nominate all lands which qualify for the National Register of Historic Places, National Landmarks, or Natural Research programs.
5. Protect all archeological and historic resources until evaluation.
6. Develop master landscape standards and criteria.
7. Establish a cooperative recreation management agreement with local Native Regional Corporation, the State of Alaska, and Canada.
8. Provide areas for public interpretative sites.
9. Establish a "people influence" management zone and provide for intensive recreation use areas.
10. Include Chitina and Nizina Rivers in National Wild, Scenic, or Recreational Rivers study.



MINERALS

Minerals Activity Recommendations affect known mineral extraction areas or potential resource areas.

In Known Extraction Areas:

1. Allow for further development.
2. Manage mineral development to allow for orderly development.
3. Allow for public mineral rock collection areas.
4. Recommend intensive minerals and geological investigation.

In Potential Extraction Areas:

1. Allow surface access to mineralized areas.
2. Allow further prospecting of potential resource areas.



WATERSHED

Watershed Activity Recommendations are planning unit-wide and also affect restricted use zones and management zones.

Planning Unit-wide:

1. Maintain present water quality.
2. Conduct intensive inventories of the Chitina Valley Watershed.
3. Manage use of heavy equipment on national resource lands.
4. Prohibit building of dams or other "improvements" which would trap water over permafrost areas, causing accelerated erosion.
5. Protect all streams with buffer strips.

In Restricted Use Zones:

(Flood hazard zones, critical erosion hazard zones, and "clear" or quality water zones are Restricted Use Zones.)

1. Prohibit development such as construction or mining.
2. Restrict all use which may damage vegetative mat.

In Management Zone:

1. In permafrost areas, provide for minimum disturbance of surface vegetation.
2. In permafrost-free areas, allow uses limited only terrain, with normal precautions to prevent accelerated erosion and degradation of water quality.



MFP Step Two: Multiple Use Recommendations

THE SECOND STEP OF THE MFP is development of multiple-use recommendations. The concept of tunnel vision is discarded in favor of the "adversary concept." Each resource specialist advocates adoption of his MFP Step One activity recommendation, but he listens to the representatives of other resources to identify conflicts or overlaps between his plan and their plans.

OVERLAYS ON THE NEXT PAGE were made to tie the MFP Step One recommendation to resource problems on the ground. In Step Two of the MFP, two or more of these overlays are used to identify conflicts and overlaps between activity recommendations. Wherever lines overlap, there is a potential management conflict.



BLM'S PLANNING SYSTEM readily identifies conflicts in a manner which helps frame solutions to these conflicts. The planning system does not automatically solve the conflicts identified; not all conflicts can be resolved or even reduced. In MFP Step Two the single-use recommendations developed in MFP Step One are compared and weighed in relation to each other. This may be done by comparing the separate overlays on the next page to each other in relation to the Chitina Valley Planning Unit map.

LET'S LOOK AT A CONFLICT depicted on the overlays. The conflict is located midway between the towns of Chitina and McCarthy, centered about five miles north of the Chitina River. The conflict, as shown by the overlays, concerns Recreation, Minerals, and Watershed.



IN MFP STEP ONE, Recreation advocated a "people influence" zone and a general recreation area which would receive intensive recreation use. Minerals advocated allowing further development of known extraction areas, and surface access to potential resource areas. Watershed advocated prohibiting of development such as construction or mining, and restriction of all use which may damage the vegetative mat. Watershed found the area was largely a "clear" or quality water zone, with two smaller areas of critical erosion hazard. Overlapping lines identify specific conflicts.

The Chitina Valley Planning Unit

RECREATION

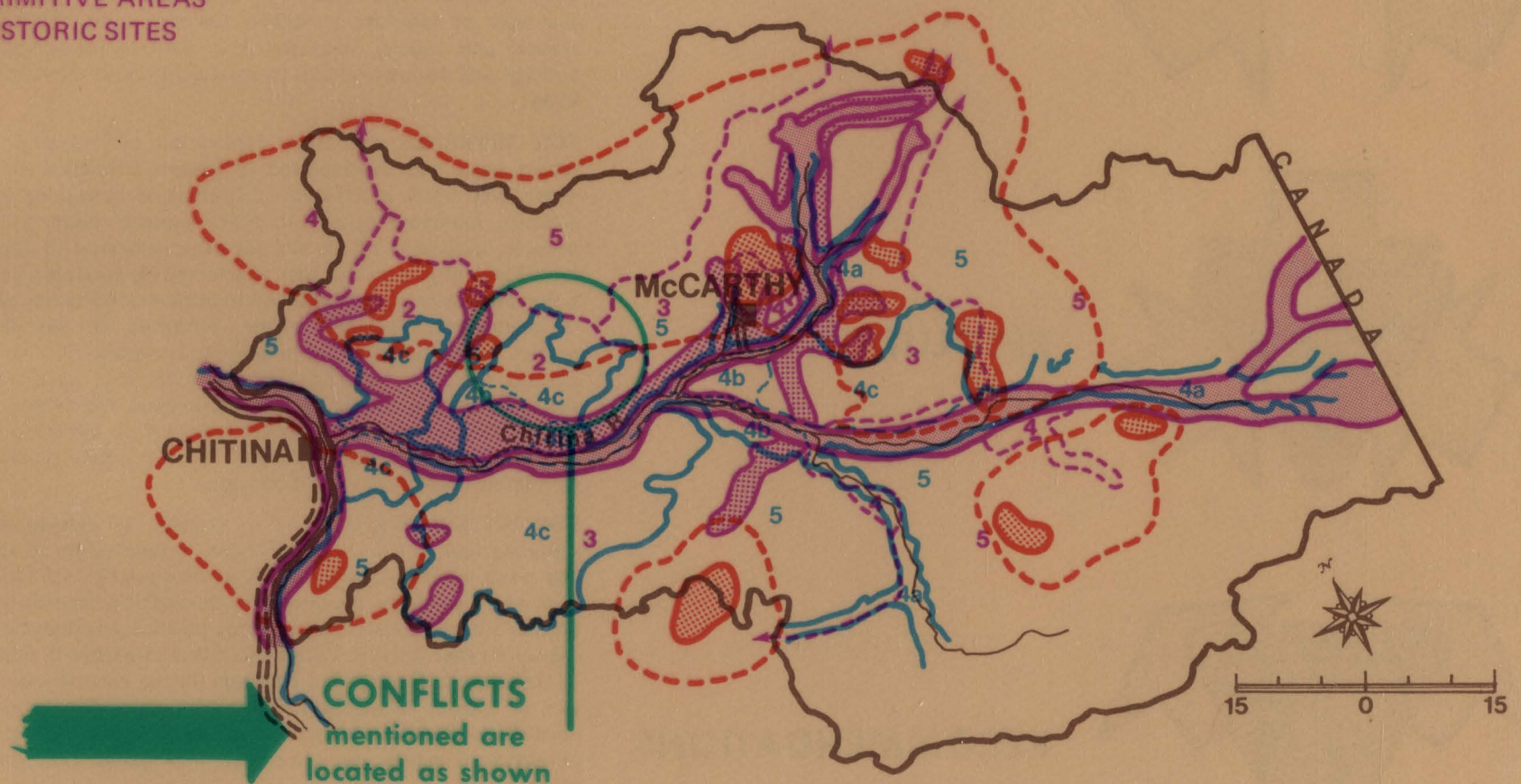
-  WILD & SCENIC RIVER
-  PEOPLE INFLUENCE AREAS
- 2 GENERAL RECREATION AREAS
- 3 NATURAL ENVIRONMENT AREAS
- 4 OUTSTANDING NATURAL AREAS
- 5 PRIMITIVE AREAS
- 6 HISTORIC SITES

MINERALS

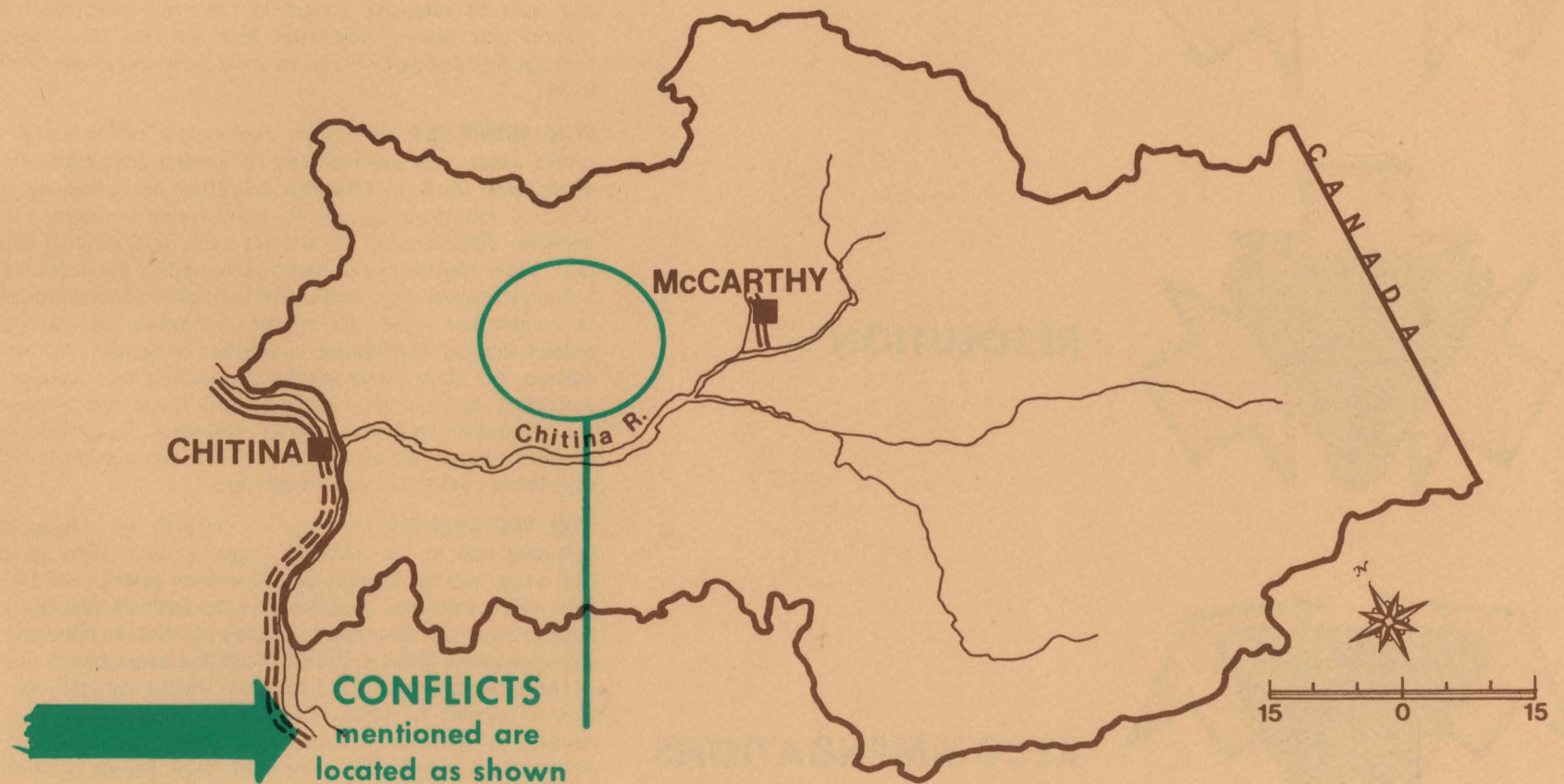
-  KNOWN EXTRACTION AREAS
-  POTENTIAL RESOURCE AREAS

WATERSHED

- 4 RESTRICTED USE ZONE
- 4a FLOOD HAZARD
- 4b CRITICAL EROSION
- 4c QUALITY WATERSHED
- 5 MANAGEMENT ZONE





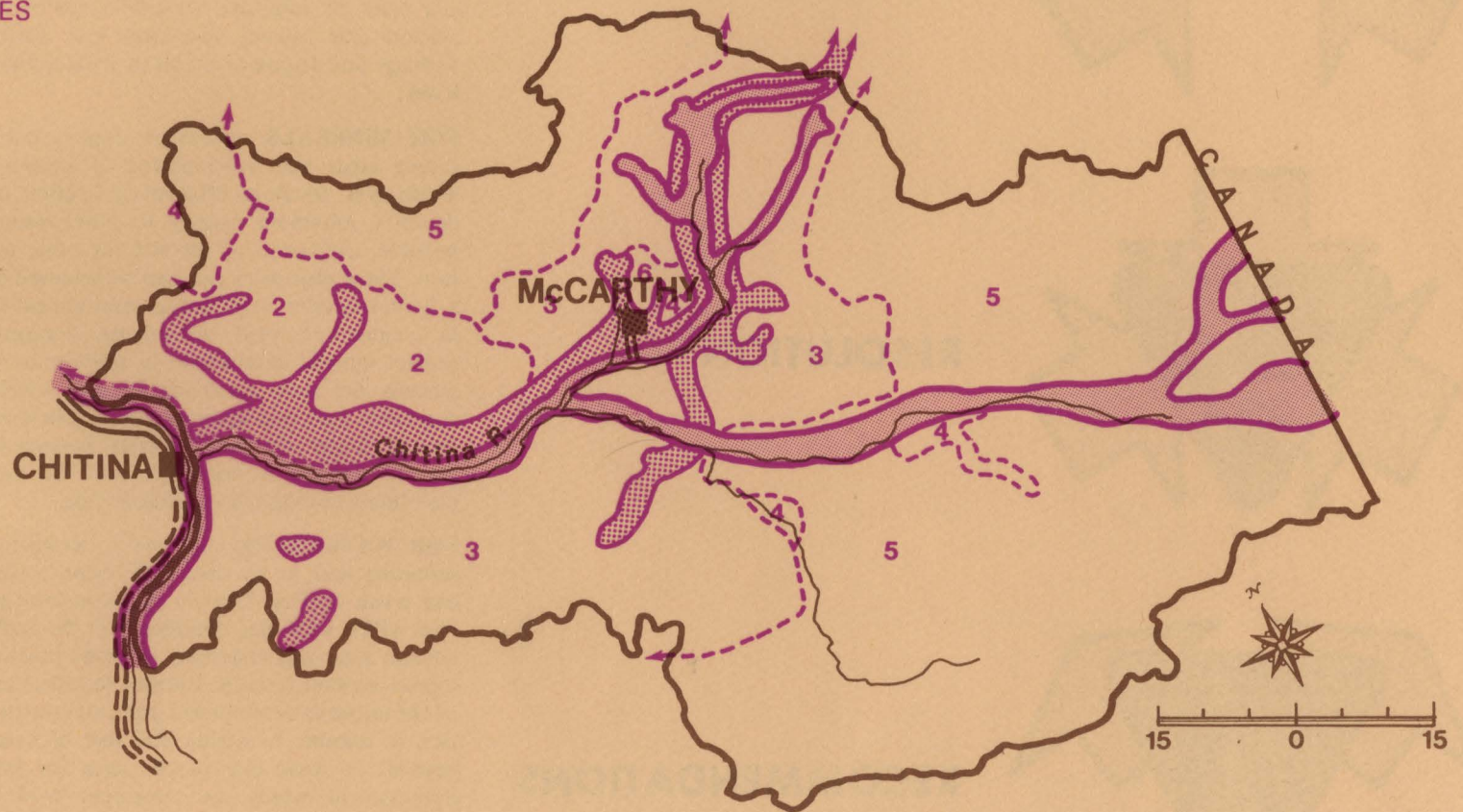
The Chitina Valley Planning Unit



The Chitina Valley Planning Unit

RECREATION

-  WILD & SCENIC RIVER
-  PEOPLE INFLUENCE AREAS
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The Chitina Valley Planning Unit

MINERALS

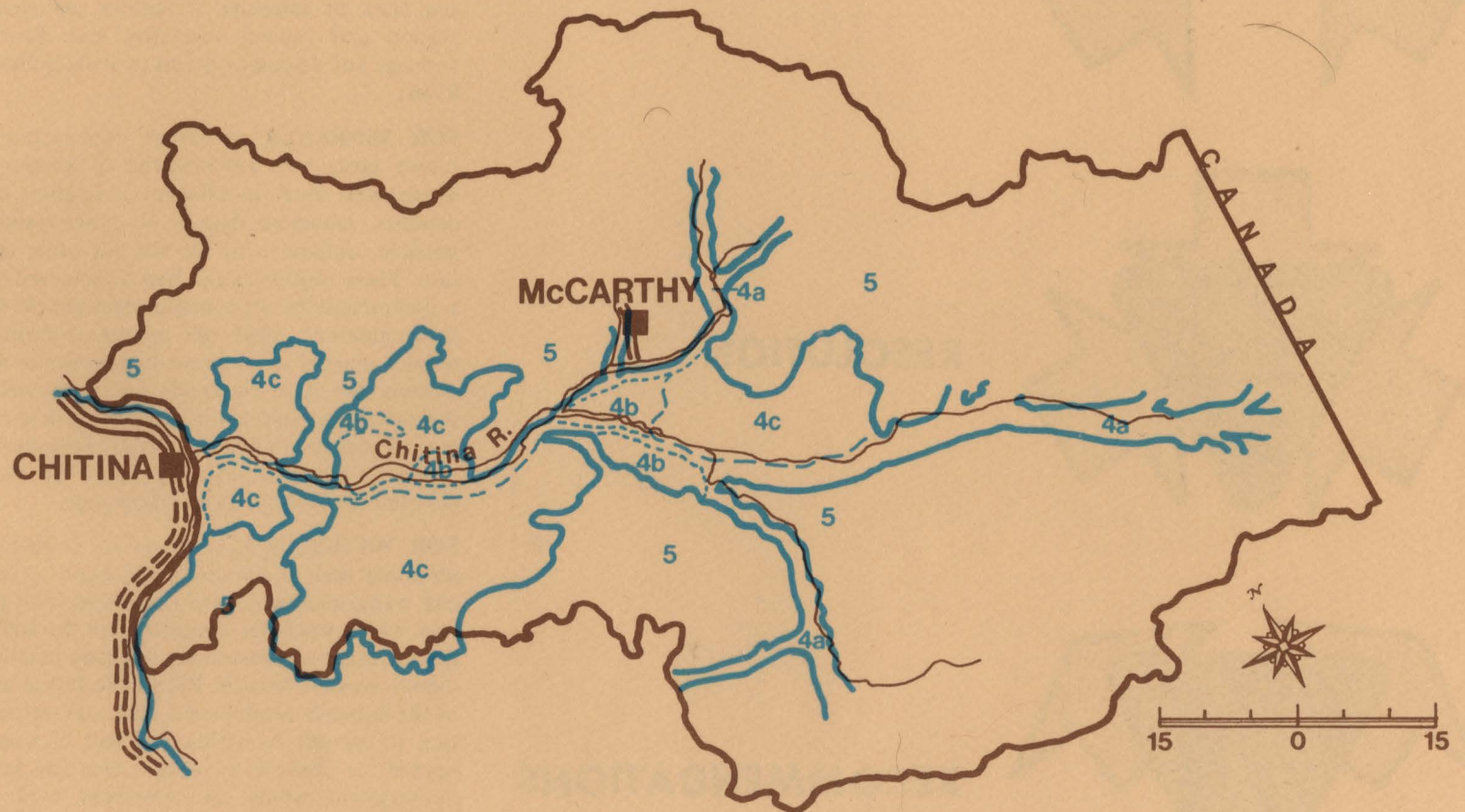
- KNOWN EXTRACTION AREAS
- - - POTENTIAL RESOURCE AREAS



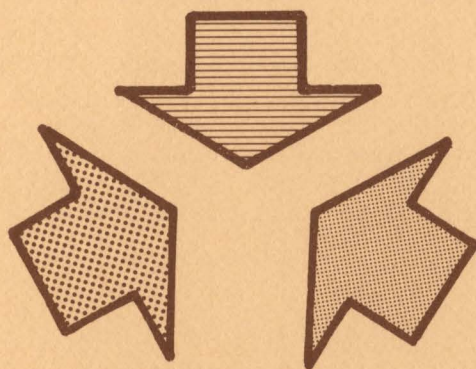
The Chitina Valley Planning Unit

WATERSHED

- 4 RESTRICTED USE ZONE
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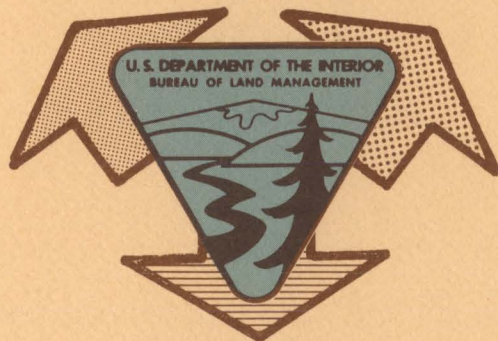
MFP Step Two: Multiple Use Recommendations



CONFLICTS



RESOLUTION



RECOMMENDATIONS

RESOURCE SPECIALISTS NOW propose alternatives to resolve the conflicts identified in the example on the last page. One of several alternatives is summarized here.

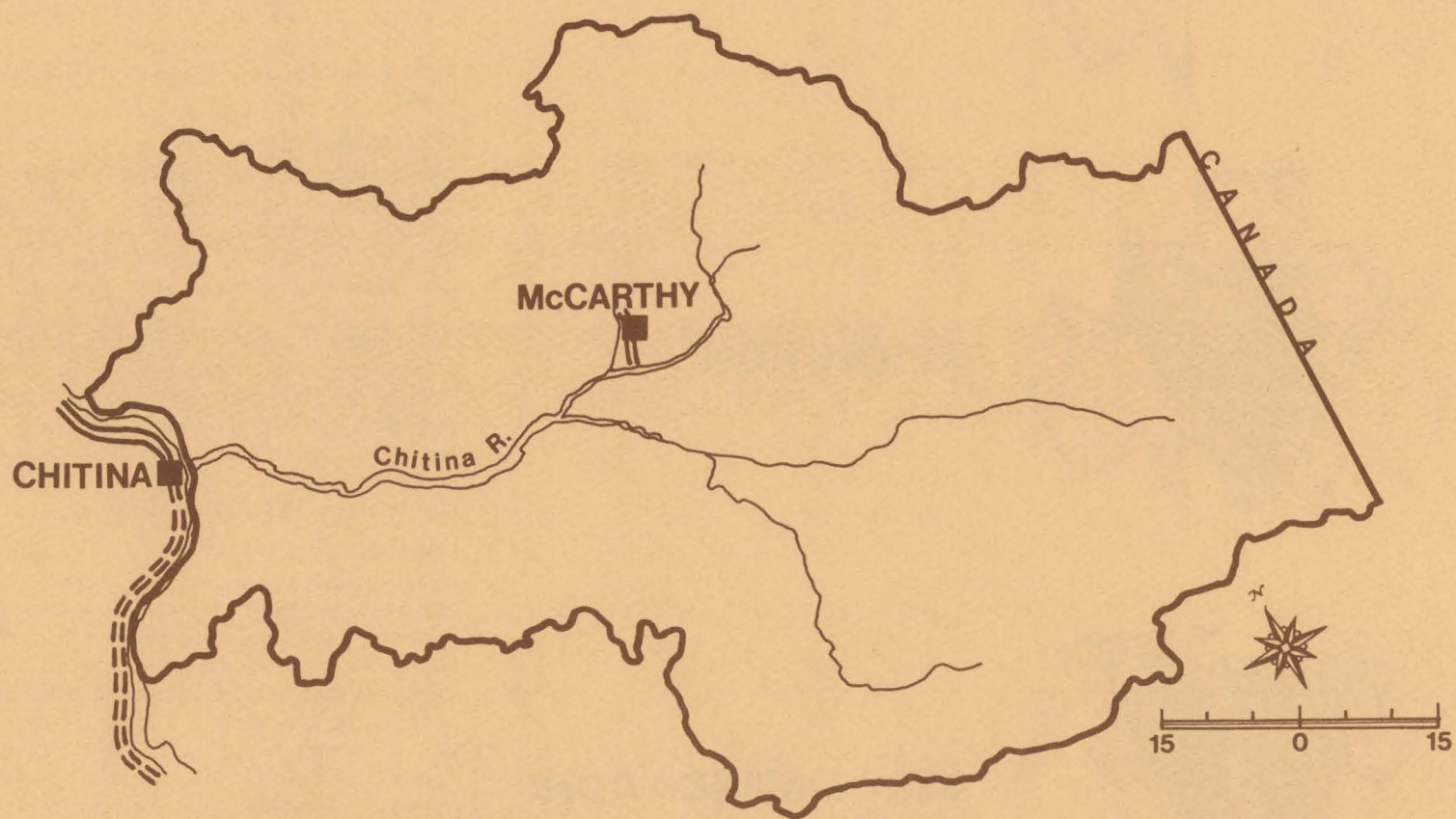
FOR RECREATION, prepare a plan for intensive recreational use of this area commensurate with present and projected demands. Developments and uses planned for this area must not degrade environmental values; recreation plans must be coordinated with mining plans and proper watershed management practices. Begin studies to determine proper locations and sizes of intensive recreation use sites to prevent soil erosion and protect vegetative mat. Provide for adequate drainage and disposal systems to avoid pollution of the Chitina River.

FOR MINERALS, encourage exploration of potential resource areas and development of known extraction areas, which will result in efficient utilization of known mineral deposits, minimum damage to other resource values, and if possible, utilization of the site for other uses after its depletion. These objectives can best be achieved by development of a comprehensive exploration-development-rehabilitation plan in conjunction with the mining companies. In this plan, restrict mineral exploration in summer to within 300 feet of streams. Set strict standards for uses which may damage the vegetative mat; and allow exploration in winter which requires use of heavy equipment, after snowpack is sufficient to prevent damage to vegetative mat. To the degree possible, coordinate mining and recreation plans.

FOR WATERSHED, continue to evaluate all existing and proposed uses in the area with regard to their effect on soils and water quality. Identify problems with present and future uses which were not considered in the analysis. Identify key erosion areas and undertake intensive practices to eliminate or reduce erosion hazards. Furnish technical assistance in design of the minerals development plan, and restrict mineral exploration in summer to within 300 feet of streams. Begin studies needed to determine proper sites for intensive recreation development which are consistent with proper watershed management.

SUPPORT ACTIVITIES such as cadastral survey, road and trail construction, and fire protection may be required as part of other activity plans and must be considered as part of this multiple-use recommendation.

The Chitina Valley Planning Unit



MFP Step Three:

Decisions

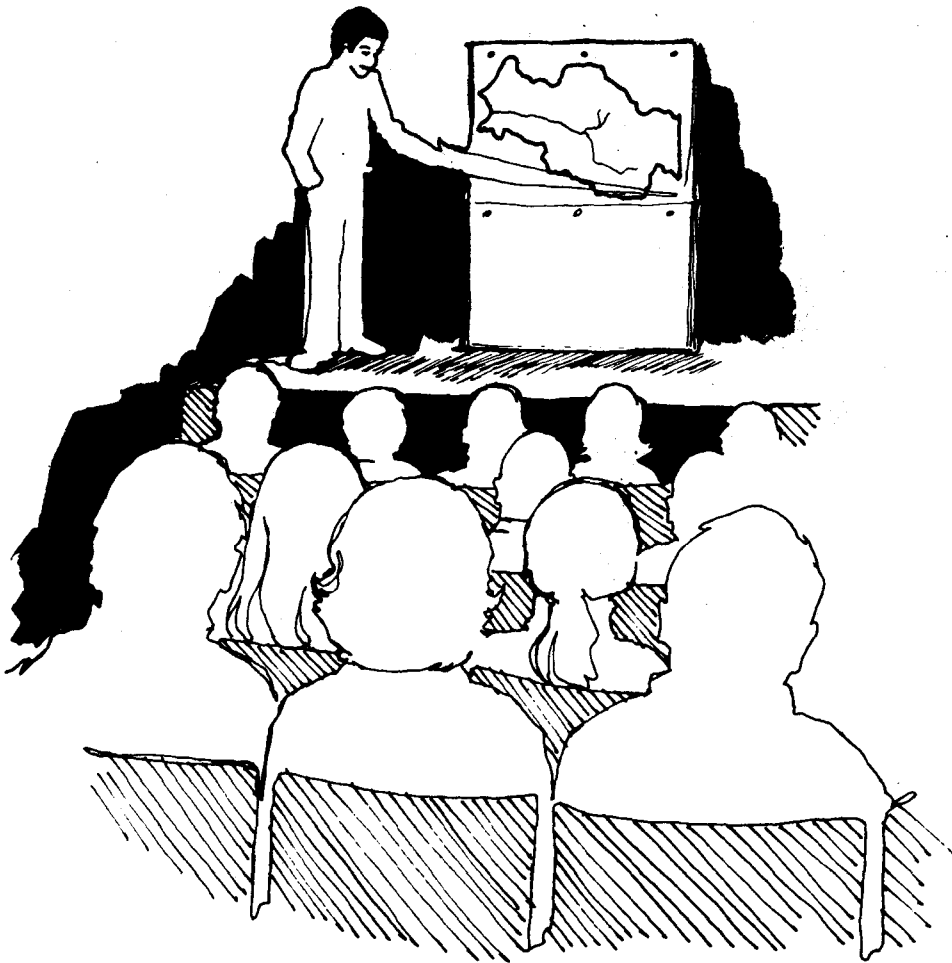
WHAT'S BEST FOR THE LAND for management purposes can be determined by considering public needs, ecosystems, resources, economics, social and other factors. All of these come together and exert their influences in the BLM planning process which leads to MFP Step Three: Decisions.

WHEN BLM BEGAN THE PLANNING process in the Chitina Valley Planning Unit, no overall priority was assigned to any specific use or uses. Before MFP Step Three takes place even the planners cannot guess what the final priority of a specific use or uses will be. MFP Step Three decisions are reached by considering specific land and resource use conflicts, proposing alternative solutions, and refining these alternatives through public participation in the decision-making process. Decisions made in this manner relate overall priorities for specific land use or uses to specified geographical areas located within the Chitina Valley Planning Unit.

ONE OF THE ALTERNATIVES recommended as a multiple-use recommendation in MFP Step Two may become an MFP Step Three Decision, if input from public participation indicates the alternative is the best available solution for management. If not, changes are made.

THE MFP STEP THREE DECISION sets forth broad objectives and constraints which guide and influence the management of the Chitina Valley Planning Unit. Activity plans are then developed, using the MFP as a guide. To develop these plans, resource specialists can use the data gathered in the Unit Resource Analysis as a guide to the environment of the Chitina Valley Planning Unit.

BLM PLANNING IS DYNAMIC: a completed Unit Resource Analysis or Management Framework Plan is used as an everyday working tool in the BLM District Office. Since objectives, needs, and the effect of decisions are everchanging, continual evaluation of BLM's planning and of the results from it are a basic part of the planning system. URA's, MFP's, and Activity Plans never receive "totally final" approval; they are subject to continual evaluation and updating.



INVOLVING THE PUBLIC in the planning and decision-making process is one of BLM's greatest responsibilities. Informal public involvement takes place throughout the planning process. However, normally at this point—between the resolution of resource use conflicts and the decision on what future management should be—a formal public meeting or presentation is held. After consideration of input from the public meetings and a full staff review of any changes brought about by that input, the decisions are made.

NARRATIVE SUPPORT FOR SINGLE RESOURCE SUITABILITY RATINGS

Livestock Forage (grazing)

The range overlay portrays those areas presently being utilized by reindeer or domestic livestock on a year long basis. Some of the ranges in the eastern portion of the state may be marginal or submarginal for year long grazing, but seasonal use may be appropriate.

Potentials are based on areas having similar terrain and vegetation as areas now being utilized. In part, the potential reindeer range is based on historical use, especially along the Bering Sea and Arctic coasts. An assumption was made that reindeer grazing could be accommodated in areas that support herds of caribou because of the close similarity in food requirements between the two animals.

Many areas exist throughout the state in mountain foothill and alpine areas which could support domestic livestock grazing at least on a seasonal basis. Some usage is expected in suitable areas adjacent to agricultural developments or in association with guided hunting services, but such usage is difficult to predict or anticipate.

Because of the difficulty of identifying and portraying potentially suitable areas in the interior and mountainous areas of the state, no attempt was made to include these areas on the overlay.

Suitability Rating:

Generally, the most serious and long lasting impact of grazing use is usually evaluated by the contribution of such use to accelerated erosion, increased sedimentation and disruption of normal water runoff patterns. Grazing use by reindeer and domestic livestock can and does cause changes in plant composition. Studies concerning the effects of grazing in Alaska on erosion, sedimentation and runoff are non-existent, but gross observations to date do not indicate significant impacts. Accordingly,

grazing use must presently be considered to have little or no impact on erosion, sedimentation and runoff patterns, and all of the presently used and potential grazing areas are rated G₁.

Timber

In dealing with the interior commercial forest of Alaska, suitability for harvest is primarily related to soil and permafrost. Heavy equipment employed in associated road construction and harvest operations makes primary impact on those two entities.

Secondary impacts are found on water quality, esthetic values, and wildlife habitat. These result from the disturbance of soil and exposure of permafrost or from the basic removal of trees.

Relationship of the existing and proposed transportation system does not bear directly on possible environmental damage associated with timber harvest. Availability of transportation merely contributes to the economics of the proposed operation.

Suitability Rating:

Existing information on location of interior commercial forest was related to permafrost and soils maps contained in the overall project. Each of those factors had been classified into amenability classes by team members.

When both soils and permafrost exhibited a relatively high amenability to disturbance, T₁ rating was assigned ($P_1 + S_1 = T_1$). Medium class amenability (T₂) resulted when the subnotation figures of soils and permafrost totaled 3 or 4. Low amenability--high risk--resulted when subnotation equaled 5 or 6.

It cannot be concluded that presence or absence of degradation factors is an overriding determinant for timber harvest. Only detailed harvest planning can provide such information. This exercise points out general areas of the interior commercial forest where problems are anticipated.

Lands (Map No. 2 - urbanization or village expansion path)

The codified ratings are only shown in the village selection areas, boroughs, and the utility and access corridors.

Difficulty in identifying other potential areas in the urban or village expansion path curtailed meaningful coverage of the entire state. An assumption is also made that the assessed areas will for the most part fulfill the urbanization needs.

After evaluating the subsystems and parameters, it was decided that the Army's Terrain Study of Alaska, Suitability for Road and Airfield Construction provided a combination of evaluations on slope, topography, soils, drainage, vegetative cover, permafrost condition which best provided the dimensions and relationship for this assessment.

Potential flood damage and ice jam areas, delineated in orange coloring on the overlay map, were automatically rated No. 3 (low amenability to environmental modification) on the composite suitability map irregardless of the codified classification on this map. In addition, the seismic zones and fault lines shown on this map were not assessed in the suitability rating. An assumption is made that any construction activity within the seismic zone 3 (most intense) will pay an extra cost in terms of foundation and construction safeguards.

Suitability Rating:

RATING NO. 1

Good to fair for roads. Some to few sites for large airfields. Slopes generally less than 5% in lowlands of alluvial and glacial outwash plains and river terrace; and 5% to 45% in upland areas, sand dune and moraines, and volcanic terrains.

Soils coarse grained with surficial layer of silt; and in other lowlands, sand and gravel with local areas of silt, peat and frozen silt, and peat. Bedrock showing in places.

Drainage good and poor in lowlands. With exception of local areas, generally good in upland areas.

Vegetation sparse to forested.

Permafrost free and permafrost common at shallow depths in northern and central Alaska.

Construction and maintenance for roads and airfields easy to fairly difficult in lowland areas, and construction moderately difficult and maintenance in general fairly easy.

RATING NO. 2

Moderate for roads and no sites for large airfields.

Lowland areas of coastal plains, river flood plains and deltas mostly flat to gently sloping, but locally interrupted by hills. Upland areas of moraine, dissected terraces, dissected uplands, low mountains, and foothills adjacent to rugged mountains. Mostly 15% to 45% slopes.

Soils mainly silty and highly organic in lowlands, with some narrow, gravelly, sandy beaches, bars, and spits in coastal areas. Soils coarse grained to fine grained, thick to thin with considerable bedrock exposed in upland areas.

Drainage generally poor in lowland areas. Arctic coastal plain dotted with marshes, small lakes, and ponds. Flood plain and deltas subject to flooding during spring. Upland areas, drainage generally good but in places many lakes, ponds, and marshy depressions.

Vegetation sparse to dense forest with areas of shrub, marsh, and tundra in lowlands. Arctic coastal plain predominantly grass, tundra and marsh. Vegetation sparse to dense forest with tundra and local areas of shrub and marsh vegetation in upland areas.

Lowland areas in northern areas, including all of arctic coastal plain underlain by permafrost. Upland in northern areas with discontinuous permafrost.

Construction and maintenance for roads in lowland areas generally difficult. Construction and maintenance generally fairly difficult in upland areas.

RATING NO. 3

Poor for roads. No airfield sites.

Flat to gently sloping lowlands of tidal flats, muskegs, bogs, and marshes. Upland areas of steep and rugged hills and mountains. Glacier in many mountainous areas. Slopes more than 45%.

Soils mostly silt, organic silt, and peat in lowlands. Some narrow sandy and gravelly beaches, bars, and spits along coast. In upland areas, soils generally shallow or lacking with much exposed bedrock.

Drainage poor with water table at or near surface; many areas subject to flooding in lowlands.

Vegetation generally sparse in lowlands. Vegetation sparse to dense in uplands.

Permafrost present in lowlands within 1 to 3 feet of surface. None in upland.

Construction and maintenance for roads difficult in lowlands. In upland very difficult.

Lands (Map No. 1)

This map shows the existing land status including federal withdrawals (pre-ANCSA), native reserves, classified areas, state selection lands patented and tentatively approved, borough boundaries, and native village selection areas (ANCSA).

It also shows existing primary and secondary roads and Alaska's proposed 20 year road location plan, railroad, the pipeline utility corridors, proposed power sites, and other existing uses such as oil and gas areas, agricultural areas, and existing mining areas.

This map will be used to help define the manageable units, particularly from the regional development standpoint.

Areas of Known Mineralization

Suitability Rating:

M 1 No significant problem extracting the type or types of mineral for which this area has potential. Permafrost areas are generally ice-poor or ice-free. Others are generally well drained.

M 2 This category occurs mostly on the Arctic Coast, in the Kobuk River valley, and on the Bristol Bay coast. In the northern areas the land is generally characterized by continuous permafrost, but easily traversed by tracked or low-pressure tired vehicles. With proper equipment serious degradation can be avoided. Winter travel would be preferable, although care must be taken to avoid drifts. The Bristol Bay area is generally permafrost free, but the surface in many areas is fragile. Muskeg, sand beds, and othe forms of unconsolidated material require planning prior to any traverse across or operation on the surface.

M 3 There are significant problems in either extracting minerals from or transporting across these lands. In the north these lands consist primarily of deep silts, often frozen but commonly not. Because of undrained surface waters resulting in muskeg conditions, permafrost may be several feet below the surface. Any work in these areas is extremely difficult, made worse by swarms of mosquitoes and other insects. In the south, the M 3 lands are glacier covered mountains. On the Alaska Peninsula there are volcanoes, often active. Access to those mountainous and volcanic areas is extremely difficult. Aircraft landing areas are usually some distance, often several miles, from mineralized sites. Winds make helicopter and aircraft use difficult and unreliable. Major faults may present hazards to oil and gas exploration or development.

Geology

A geologic map of Alaska shows clearly the extensions of the Rocky Mountains across the State. Metamorphic rocks extend across the northern portion of the State forming the Brooks Range, dipping under the waters of Kotzebue Sound and Selawik Lake, and reappearing as the Seward Peninsula. Intrusive rocks, many partially metamorphosed, extend through the middle part of the State as the Alaska Range and the White Mountain-Fortymile area ranges. The same extension shows up also in Alaska as the Panhandle, or Southeastern Alaska. These are the areas with greatest potential for mineral deposition.

Large areas of sedimentary rocks have been deposited in several areas, notably on the north flank of the Brooks Range, on the right side of the lower Yukon River, the Kuskokwim Mountains, the Prince William Sound area, lands to the east, and in the Kandik River area. These are the areas, in general, with potential for oil and gas, coal, oil shale, and similar bedded deposits.

Unconsolidated deposits cover large lowland areas. The adjoining bedrocks can be projected under the silts and gravels, but boundaries between them can, in most cases, only be guessed. Unconsolidated materials on the Arctic Coast and at Bristol Bay, however, almost certainly cover sedimentary deposits similar to the adjacent uplands.

Throughout Alaska there are several volcanic zones, some active, some dormant, some inactive. A few are shown on the map. The others, generally smaller areas, occur throughout the State.

Information for this map was generalized from the USGS "Geologic Map of Alaska," compiled in 1957.

Geothermal

Information relative to the potential for developing power and other resources by geothermal means is taken directly from the map drawn by the Geological Survey. It, in turn, reflects the lands classified by the Survey. Those lands are described in USGS Circular 647, together with two additional more recently classified areas. Total area is about six million acres. The bulk of these lands are classified as prospectively valuable for geothermal steam, based on geologic inference. Such inference consists of one or more of the following three indicators:

1. Volcanism of the late Tertiary or Quaternary Age.
2. Geysers, fumaroles, mud volcanoes, or thermal springs at least 40° F. higher than average ambient temperature.
3. Subsurface geothermal gradients generally greater than twice the normal.

There are, however, three small known Geothermal Resource Areas (KGRA). One is at Pilgrim Springs on the Seward Peninsula; two, Geyser Spring Basin and Okmok Caldera, are on Umnak Island.

As might be suspected, since volcanism occurs throughout Alaska, the prospectively valuable areas are widely scattered. The closest to Anchorage, center of half the State's population, is 80 miles to the west near Mt. Spurr, an active volcano. To the east about 200 miles, there is a small area near Tazlina Lake and a large area encompassing the Wrangell Mountains. Since those areas are defined largely on the basis of favorable geology, it follows that considerable exploration would be necessary in order to determine whether or not geothermal development would be feasible in any of those areas.

Phosphate - Oil Shale - Bituminous Rock

The map reflects only lands classified by the Geological Survey as being potentially valuable for phosphate, oil shale, or bituminous rock. The bulk of the oil shale and phosphate deposits lies in the Brooks Range; a small portion lies in the Nation River-Kandik River area near the Canadian border.

The oil shale deposits, although locally rich, are very thin, seldom over five feet in thickness. In total, the volume may be significant, but the area is so large that it is difficult to view it as a potential resource within any reasonable time frame. An in situ method of recovery, applicable to such deposits would, of course, change the picture.

The bituminous rock, closely related to coal, occurs in the same general area as the oil shale. Known occurrences are small. Though possibly of local value, it does not appear to have significant commercial value.

Phosphate deposits occur in the eastern Brooks Range and in the Nation River areas. A road to the North Slope might make the Brooks Range deposits valuable, particularly as a backhaul. Possible markets would exist as fertilizer in the Fairbanks and Anchorage areas. Because of their dense population and consequent need for intense cultivation practices, Japan, South Korea, and Taiwan might offer overseas markets.

Because of high shipping costs and adequate supplies, the "Lower 48" does not appear to offer a market.

The Geological Survey is the source for information shown on the overlay.

Coal Bearing Rocks

Coal occurs widely throughout Alaska. On the overlay only the larger known deposits are shown. There are, in addition, a large number of small exposures, most not even of local value.

The first coal was mined under franchise from the Russian government near Port Graham. Poor quality, and inefficient mining and transportation techniques, forced a shutdown after a few years' operation. About the turn of the century a large number of coal claims were located in the Bering Sea area. This good quality coal had potential for export to the west coast. However, withdrawal of coal from location (even from leasing for a few years), discovery and development of large coal beds in the Western States, and, particularly after World War I, rising transportation costs, combined to halt development.

In recent times, since the operation of the Alaska Railroad and its narrow gauge predecessors, all production has been from the Matanuska Field, near Sutton; the Nenana Field, near Healy; and, within the past 5 years, the Beluga Field, west of Cook Inlet. The latter two support mine-mouth power plants.

Prospecting permits have been issued for lands in the Bering River Field and the Chukchi Sea Field with the view towards developing markets in the Orient. To date, however, the transportation and marketing problems have prevented development.

This overlay is based on USGS Bulletin 12H2-B, Coal Resources of Alaska, which included other unrelated information. Reference was made also to the Bureau of Mines Technical Paper 682, Analyses of Alaska Coals, for many of the small deposits.

Possible Petroleum Provinces

Large areas of Alaska have potential for petroleum development. The potential is based on geologic inference; whether or not an oil and gas deposit exists can be determined only by drilling. Various geological and geophysical techniques are used to determine prospective petroleum areas and to recognize the anomalous areas where drilling may be productive.

The sedimentary formations favorable to oil and gas accumulation cover large areas of Alaska and extend into the major portion of the continental shelf. To date, the only discoveries have been in the Cook Inlet area and in a portion of the North Slope sediments. Although natural petroleum seepages have been known for nearly a century in the Yakataga area, drilling has failed to disclose a commercial field.

Information for this overlay was taken directly from the USGS map which shows areas defined by both the Geological Survey and the Association of American Petroleum Geologists.

Locatable Minerals

Information for this map came from the Mineral Resource Inventories maintained by the two districts. They in turn are a compilation of information contained in the USGS, Bureau of Mines, and Alaska Division of Geological and Geophysical Surveys publications, as well as information gathered by BLM.

As might be expected, the bulk of the known deposits lie in the metamorphic and intrusive areas. Deposits occurring in areas broadly shown as sedimentary, generally are associated with intrusives which show up on more detailed maps. As always, of course, mineralization may occur any place.

Much of the known mineralization is related to major faults. Areas a few miles either side of the many fault systems may be regarded as "possible mineral provinces," that is, they are the most favorable areas for mineralization.

Placers are formed by the natural erosion and concentration of lode deposits. Most minerals are either dissolved or broken up by the water and gravel movement over long periods of time. Gold and platinum particles, however, tend to retain their shape, thus forming the best known placer deposits. Commonly, lode deposits are found in areas of placer deposition, though often their grade is uneconomical.

Potential Mineral Areas

Significant mineralization commonly occurs along and near major faults. Knowledge of their locations can be used to great effect in finding new ore bodies. Where two or more faults cross, the potential for mineral deposition is increased in proportion. Two such areas are in the Crazy Mountains and the White Mountains where, to date, no discoveries have been recorded. They do represent, however, excellent areas for prospecting.

The overlay shows only the known major faults. Associated with each is a fault system, commonly parallel to the major fault. Such systems serve to effectively widen the potential areas of mineralization.

Information for this overlay was taken from Geologic Map of Alaska, by the Geological Survey, and from Plate 3, Tectonic Elements, Mineral Deposits, and Acidic Intrusions of Alaska, found in the final report, Mineral Resources of Northern Alaska.

Possible Metalliferous Provinces

1. Includes areas with currently producing mines, once productive deposits with remaining resources and deposits with high development potential.
2. Includes areas of known mineral occurrences and areas of high metal resource potential based on geologic settings, and geochemical and geophysical data.
3. Includes areas adjacent to and geologically similar to category II. Considered favorable for metal resources.
4. (And un-numbered areas.) Includes areas of low or unknown metal resource potential. (This overlay is based on unpublished USGS material.)

Water

Suitability Rating:

- W 1 Little or no exploration necessary to find plentiful supply of good quality ground water. Surface waters of good quality and in plentiful supply. Water supply generally not considered a bar to development and use.
- W 2 Exploration necessary to find good quality ground water. Surface waters generally of good quality but may be high in organic matter. Availability of water may limit location of developments and use of some areas.
- W 3 Water supply, especially ground water, may exercise considerable influence on use and development. Considerable exploration necessary to find ground water. Ground water, even when available, is of generally poor quality. Surface water may be locally available, but flows may fluctuate widely seasonally.

Water Resources

Map Symbol A - Generally poor quality ground water, plentiful to restricted supplies of surface water.

Extensive prospecting required to find usable ground water supplies. In the Brooks Range and North Slope, very little possibility of obtaining usable ground water supplies except from beneath streams and the large deeper lakes. Area generally underlain with permafrost, aquifers may be found in unfrozen areas above, within, or below the permafrost. Shallow to moderately deep wells (up to 100 feet in depth) may yield moderately hard to soft water (less than 200 ppm CaCO_3) of generally low to moderate mineral content (less than 1,000 ppm total dissolved solids). Deep wells may yield hard water (more than 200 ppm CaCO_3) of high mineral content (more than 1,000 ppm total dissolved solids).

Surface waters soft to moderately hard (less than 200 ppm CaCO_3), with generally low mineral content (less than 400 ppm total dissolved solids). Many lakes and smaller streams have moderate to high organic content.

Map Symbol B - Restricted supplies of good quality ground water and surface water.

Prospecting is generally required to determine ground water sources. In the higher mountain areas, considerable or extensive prospecting necessary. Permafrost may be present or absent. Where permafrost is present, aquifers may be found above, within, or below the permafrost. Water may vary in quality from soft to hard, with mineral content generally low. Locally, some areas may yield water with high iron content.

Map Symbol C - Plentiful supplies of good quality ground and surface water.

Generally little or no prospecting required to obtain plentiful supplies of ground water. Large supplies (more than 150,000 gallons per day) available in wells ranging

from 25 to 500 feet in depth. Shallow wells (less than 25 feet) may yield variable supplies from less than 15,000 to more than 1,500,000 gallons per day. Most ground water is generally soft with low mineral content. Locally may vary to moderate or high hardness. Excessive pumping near coast may cause salt water intrusion.

Surface waters are abundant, generally soft and of low mineral content. Streams may be heavily silt laden in summer.

Ground Water - May need more than one well in an area to get volumes indicated. Shallow wells may go dry in late summer or winter.

Springs are located at many scattered locations throughout the state and may be developed for small to meager supplies of water.

Surface Water - Decreased flows during winter. Small streams may become dry by late summer. Wide seasonal and yearly fluctuations in small lakes and may freeze to bottom. Suspended sediment load high to moderate during summer in rivers containing glacial meltwater, but absent in winter. Fine material in suspension may be difficult to filter out. Large rivers in interior commonly have both moderate suspended sediment load and organic content. Smaller lowland streams and lakes may have high organic content with unpleasant taste and color to water. Mineral content and organic contaminants may be concentrated in small lakes when frozen in winter.

<u>Quantity</u>	Large	More than 1,500,000 g/day
	Moderate	150,001 - 1,500,000
	Small	15,001 - 150,000
	Meager	Less than 15,000

Quality

Term	Hardness ppm CaCO ₃	Mineral Content ppm total dissolved solids	Suspended Sediment Load ppm
Low	Less than 100	Less than 400	Less than 20
Moderate	100 - 200	400 - 1,000	20 - 100
High	200+	1,000+	100+

Depth of Wells

Shallow	Less than 25 feet
Moderate	25 - 100 feet
Deep	101 - 500 feet
Very deep	500+

Surface Water Density

Term	Miles of stream 100 sq. miles total surface area	Sq. miles lake surface 1,000 sq. miles total surface area
Abundant	More than 20	More than 15
Scattered	10 - 20	1 - 15
Rare	Less than 10	Less than 1

Watershed - Permafrost

Permafrost - Defined as base material that has been at a temperature below 32°F. continuously for two or more years.

Mountain Areas - Where summits of the mountains generally exceed 3,000 feet in altitude. Bedrock and thickness of permafrost is influenced directly by heat flow from the center of the earth. The development of permafrost tends to be restricted under these conditions, but is also influenced by altitude, character of materials, soil moisture, insolation at ground surface and vegetative cover. These influences cause extreme variation in thickness and temperature of permafrost in the mountainous areas.

Lowland and Upland Areas - Include hilly and mountainous areas where summits are generally less than 3,000 feet in altitude. Underlain predominantly by thick unconsolidated deposits, locally by bedrock at or near surface. Thickness and temperature of permafrost less variable than in the mountainous areas.

General

Water Bodies - Throughout the area where permafrost occurs, large rivers and large deep lakes influence location and thickness of permafrost. Permafrost may be either absent or located at considerable depth below such water bodies. Heat from the waters tends to decrease thickness and increase the temperature of permafrost in adjacent areas. In the more southerly areas, permafrost is commonly absent in the vicinity of large water bodies.

Glaciers - Areas beneath glaciers are considered to be generally free of permafrost.

Thermal Springs, Active Volcanoes - Permafrost is absent in close proximity to these features. The temperature influence tends to decrease thickness and increase temperature of adjacent permafrost.

Hazard Ratings:

- P 1 Generally permafrost free or isolated masses of permafrost. Permafrost occurs sporadically and may be in thin lenses near the surface or at considerable depth. Permafrost generally associated with old lakebeds or other filled-in areas. Permafrost generally not a bar to use and/or development.
- P 2 Discontinuous permafrost and numerous isolated masses of permafrost. Temperature of permafrost generally near melting point. Surface disturbance in areas underlain by fine materials will cause degradation and erosion on sloping ground. Permafrost in coarse deposits pose less of a problem. Some areas free of permafrost.
- P 3 Continuous permafrost areas. Sensitive to disturbance and easily susceptible to erosion. The more southerly area of continuous permafrost in fine materials is extremely susceptible to permafrost degradation and massive erosion with surface disturbance.

Watershed - Suspended Sediment

The map portrays a measure of the suspended sediment load carried by flowing waters. Sediment loads are generally highest during the summer months and lowest in winter. The overlay shows the normal summer concentration of suspended sediment.

One grouping is shown where waters originating within the area carry normal sediment loads of 5 - 50 mg/L. Streams passing through the area may contain variable loads ranging from 50 - 2,000 mg/L.

Major drainages flowing through the area may not conform to the general pattern of sediment loading because of origin and transport of material from other sediment zones.

Hazard Rating

One of the rating factors for water quality is suspended sediments. Generally, the higher the load of suspended sediments, the lower the quality of the water. Streams with high sediment loads are not particularly aesthetically pleasing and are often poorly suited to recreational use. Fish production is generally poorer in such streams.

Conversely, clear streams have high potential recreational values, are aesthetically pleasing, and are generally better fish producers.

The following hazard ratings are based on the adverse impacts which could occur with accelerated erosion caused by development and use. The ratings were determined by the susceptibility of the waters to degradation of water quality, aesthetics, recreation, and fisheries production should accelerated erosion occur.

S 1 - Least susceptible to damage.

S 2 - Moderately susceptible to damage; severe in the clearer streams.

S 3 - Most susceptible to severe damage.

Wildlife

Suitability Rating:

H 1 - Low Potential Impact

Use and development expected to exert little or no impact on wildlife. Locally, impact may be high in minor concentration or key range areas. Most wildlife species have sufficient flexibility to tolerate some changes in habitat.

H 2 - Medium Potential Impact

Includes many of the major waterfowl production and resting areas, important for the maintenance of continental waterfowl populations. Also includes calving areas for minor caribou herds where concentration occurs during the calving season. Locally, impact could be high if human use and development is concentrated in key areas.

H 3 - High Potential Impact

Includes areas with a large mix of species, major cold water fisheries, major salmon producing streams, concentration areas for various species, key or critical habitat for either or both resident or migratory species, known habitat for rare or endangered species (glacier bear and peregrine falcon), key caribou calving areas and migration routes, remnant sheep populations and concentration areas for raptors. These areas are considered to be most susceptible to influence by man on both habitat and the wildlife species themselves.

Wildlife Habitat Evaluation

Wildlife here is used in its broadest sense, including mammals, birds, and fish species. Each species has its own requirements of food and shelter and will only be found in those areas where its needs can be met. Some species have very special requirements and are therefore found only in restricted areas; others can survive with a broad spectrum of conditions and are more widely distributed. Species with specialized needs are more vulnerable to changes in the environment and to man's presence and intrusion. Others, the more adaptable species, can tolerate some environmental changes and are therefore more tolerant to man's intrusion.

Still other species, particularly the larger predator species such as the wolf, wolverine, black bear, brown/grizzly bear, may be generally distributed depending upon availability of food, are only secondarily affected by environmental change and only

insofar as their food supply diminishes or increases. However, these species may compete directly with man and when the competition or conflict becomes severe enough, these animals are removed or destroyed. The wolf, wolverine, and brown/grizzly bear are sensitive to man's intrusion and throughout history these species have been decimated or completely extirpated when man intruded in areas they formerly occupied.

The rating system as used here is based entirely on the existing habitat and wildlife species and the potential impact of man's use and development as a force inducing the changes.

Factors which must be considered include: 1) Presently known pattern of distribution of wildlife species; 2) The mix of wildlife species occurring in any particular habitat area; 3) The sensitivity of the habitat to damage or degradation by human use and development; 4) The sensitivity of the individual species to human intrusion (also expressed as tolerance to human use and development); and 5) Habitat areas critical to the survival of a species during some stage of the life cycle.

Wildlife - Big Game Species

The wildlife overlay on big game species should be used with some caution. Many of the ranges outlined include only those areas where there are known concentrations. For example, moose are distributed widely throughout the state, but the overlay only indicates those areas of known high population concentration. The brown/grizzly bear is distributed throughout the state, especially in the coastal and mountainous areas, but the range shown on the map indicates those areas of known relatively high populations. Black bear range is found throughout much of the state, especially in the forested and brushy areas. Wolves are also found widely distributed throughout the state except for the Aleutian Islands, but no range is indicated on the overlay.

activities. This overlay displays the amenability of the land to withstand degradation from this use.

No particular form of recreation is considered. Assume the entire gamut from ORV to hikers. Assume no management of these activities--no effort to reduce impact. No consideration is given on this overlay to the availability of the lands--access.

R₁ - High amenability. No flood or avalanche danger. Stable soils. Isolated permafrost masses or free from permafrost.

R₂ - Medium amenability. Hazards from flood, ice jam overflow, or avalanche. Permafrost continuous or numerous masses.

R₃ - Poor soils or high risk of permafrost degradation. High risk from flood or avalanche.

Recreation and the Environment

Due to the massive variety of things, activities, and uses called recreation, every acre of land has "recreation value." Generally, several values exist on each acre and these, all too often, are not compatible with each other.

As a first aspect of recreation, consider the one-of-a-kind entities found in a specific location. This includes cultural values such as historical or archeological sites. It also involves natural values such as unique land features and forms and, to a certain extent, primitive values and provision for protection of representative samples of each ecotype.

Secondly, each user knows the type of area and often the place which will give the greatest opportunity for a high quality experience in a given activity. Due to economic

considerations, including travel time, a user may often accept the trade-off of a lower quality experience for more occasions at an economically preferable (closer) location. This leads to greater impact of recreation use adjacent to population centers and the transportation network irrespective of site suitability.

Thirdly, each type of recreation activity carries its own "cost" in terms of impact on the environment. Motorized recreation vehicles (ORV) have an impact different from hunting (without vehicles) or sightseeing.

Fourthly, impact can be reduced or tempered through management by the owner. Direction and administration of use includes facilities for the owner and personnel to work with the user. The owner must decide what impact he will tolerate for each recreation activity and provide necessary inputs to manage to that level.

Suitability Ratings:

This assessment combines risks associated with use of land with risk from natural hazards to arrive at amenability to people use. Durability of soils--their ability to withstand abuse--is closely correlated with type and extent of permafrost. Both were considered and then combined, together with potential for hazards such as avalanche, floods, and ice jams, to achieve classification.

Risk of environmental degradation through recreation use is assumed to be equal within a classification without regard to actual availability of the land to the recreation visitor. That is to say, it is not important to consider if the public actually recreates there; the risk associated with such use still exists.

In application, it is likely that present impact will be exhibited primarily on those areas adjacent to the transportation network or close to population centers. This aspect must be brought out during subsequent phases of the overall exercise in order to fully reflect the environmental impact of recreation.

Cultural Values

This assessment shows, to the extent possible, historically and archeologically significant areas. Within areas specific sites may be known, but this is not to say that all possible sites are located.

Sites may have scientific significance as well as potential for a properly protected and interpreted recreation entity. Areas known to contain additional unlocated or unexamined sites require protection against intentional or inadvertent damage.

Data contained on the cultural values overlay places a constraint on other land uses. Assume that any use of the land may compromise or destroy cultural values. Any decision relative to the priority role of cultural values may modify or remove the constraint. Legal constraints such as those contained in the Antiquities Act cannot be circumvented.

Natural Values

This assessment shows those areas containing natural values in three broad categories: research natural areas, primitive areas, and outstanding natural areas.

Research natural areas provide a library of ecotypes and natural features for scientific and educational purposes. Public use is controlled to the extent necessary for assuring the primary purpose of the area.

Primitive areas are representative natural environments wherein man's impact has been and will remain minimal. Since much of Alaska is basically in this category, value judgments are made in preparation of the overlay to select areas representing highest primitive values. Basically, consider as wilderness values. "Outstanding natural areas" has many features of the other categories. It is listed separately to assure consideration.

Use Impact Zones

Suitability for people use overly has related potential for environmental degradation without regard to accessibility. The actual degree of impact, however, is strongly influenced by access--transportation network and population location. These factors must be considered if a true picture is to result.

Recreation Overlays

A series of five overlays has been prepared to portray aspects of the recreation picture. Individual narratives indicate sources and relationships of each.

Overlay Workup 1 - Soils and Recreation

On this overlay soil information from the Army terrain study has been classified into two major classes:

- (1) Those that are workable or manageable, and
- (2) Those which are considered to be difficult to do anything with. The broad term "workability" is a reflection of the soils' intrinsic characteristics when subjected to man's manipulation (by construction or use).

The idea of this overlay is to have information on soils to have input on the environmental risk overlay.

In addition to the soils information, permafrost conditions were taken into account. For this information we use the permafrost overlay directly.

Overlay Workup 2 - Hazards and Recreation

On this overlay information presents environmental conditions which may cause harm or death to the user. Areas having potential for flood, avalanche, or ice jam are plotted.

Overlay Workup 3 - Environment Risk Areas for Recreation

This overlay combines soils, permafrost, and hazards onto one presentation. The legend identifies the breakdown into the three categories: High, Medium, and Low risk areas. This is the same information as contained on the "Suitability for People Use Overlay."

Perhaps one could stop with this overlay. This would show where the environment and recreation are or are not amenable. However, one still has to know where the user will be and relate this with the environment risk areas.

Overlay Workup 4 - Access Effect Zone from Recreation

This overlay shows the areas of Alaska considered to be an attraction from the user's point of view. Access takes into account the State Highways' future 1990 primary roads plan, ferry routes, and water routes.

Air access points in back country locations have not been plotted due to map scale and area affected.

Attractions and effects plotted with consideration of the majority of the using public in mind--this shows where the major recreation use impact will be.

<u>Effect zones used</u>	<u>Zone reach one side</u>
<u>A. Road</u>	
1. In or near major attraction	20 miles
2. Between major attractions and within 120 mile radius of population centers	15 miles
3. Between major attractions and outside 120 mile radius of population centers	5 miles
4. Within 40 mile radius of population centers	Total area
5. In or near minor attraction	10 miles
<u>B. Water</u>	
1. Inside 120 mile population radius	3 miles
2. Remainder of State (Cannot show on map E scale; have attempted along major rivers)	1 mile

Overlay Workup 5 - Recreation and/or Environment

This overlay is the final presentation. It reflects the degree of compatibility between public recreation use and environmental conditions. This overlay is based on combining:
 (1) Where the major use will be, and (2) Location of environmental risks.

Assumptions made to develop Recreation Overlay 5:

1. People will follow the past established trends in pursuit of a recreation experience.
2. The major portion of the recreation impact will continue to radiate out from population centers and along the primary highways.
3. Major attractions will continue to draw use. Roads leading to the major attractions will receive a higher portion of the use.
4. Management of recreation will continue at the present level (with only limited control and direction applied).

In application, an area having high suitability for people use (R1 on the Suitability Overlay) would have high amenability to recreation use. Areas of low suitability (R3) might also reflect high amenability if there is little likelihood that people will be using it.

MULTI-RESOURCE SUITABILITY KEY TABLE

MULTI-RESOURCE SUITABILITY KEY TABLE

No.	G	T	L	M	W	H	R
1	1	-	2	2	3	2	3
2	1	-	2	2	3	2	2
3	1	-	-	2	3	2	2
4	1	-	-	2	3	2	3
* 5	1	-	-	2	3	1	3
6	1	-	-	2	3	3	3
7	1	-	-	1	3	3	3
* 8	1	-	-	2	3	1	3
9	1	-	3	2	3	2	3
10	1	-	3	2	3	2	2
11	1	-	-	2	3	2	3
12	1	-	-	1	3	1	3
13	1	-	2	2	3	3	3
14	1	-	-	2	3	3	2
15	1	-	2	2	3	3	2
16	1	-	1	2	3	3	3
17	1	-	1	2	3	2	3
18	1	-	2	1	3	3	3
19	1	-	1	1	3	3	3
20	1	-	1	1	3	3	2
21	1	-	-	1	3	3	2
22	1	-	-	2	3	1	2
23	1	-	-	1	3	1	2
24	1	-	-	-	3	1	3
25	1	-	1	2	3	1	2
26	1	-	1	2	3	2	2
27	1	-	1	2	3	1	3
28	1	-	1	1	3	1	2
29	1	-	2	1	3	1	3
30	1	-	2	1	3	1	2
31	1	-	3	-	3	1	2
32	1	-	3	-	3	1	3

No.	G	T	L	M	W	H	R
33	1	-	-	2	3	3	2
34	-	-	-	-	3	1	3
35	-	-	-	2	3	1	3
36	-	-	-	2	2	1	2
37	-	-	-	-	2	1	3
38	-	-	1	-	2	1	3
39	-	-	-	-	1	1	2
40	-	-	-	-	1	1	3
41	-	-	1	-	1	1	2
42	-	-	1	-	2	1	2
* 43	1	-	1	-	2	1	3
44	1	-	1	-	2	1	2
45	-	-	-	-	2	1	2
46	-	-	-	-	3	1	2
47	1	-	1	-	1	1	2
48	1	-	1	2	1	1	3
49	-	-	-	2	2	1	3
50	1	-	-	2	2	1	3
51	-	-	2	-	2	1	3
52	-	-	2	-	2	1	2
53	-	-	3	-	3	1	3
54	-	-	3	-	2	1	3
55	-	-	-	1	2	1	3
56	-	-	-	1	2	1	2
57	-	-	-	1	1	1	2
* 58	1	-	-	1	2	1	2
59	-	-	-	1	3	1	3
60	1	-	-	1	3	3	3
61	1	-	3	1	2	3	3
62	1	-	3	1	3	3	3
63	1	-	3	1	3	1	3
64	1	-	3	-	3	3	3

No.	G	T	L	M	W	H	R
65	1	-	-	-	3	3	3
66	-	-	-	-	3	3	3
67	-	-	3	-	3	3	3
68	-	-	2	1	3	1	3
69	-	-	-	1	3	1	3
70	-	-	-	1	3	3	2
71	-	-	1	1	3	3	2
72	-	-	2	1	3	3	2
73	-	-	-	1	3	1	2
74	-	-	-	2	3	2	3
75	-	-	3	1	3	1	3
76	-	-	2	1	3	1	2
77	-	-	3	1	3	1	2
78	-	-	-	1	3	2	3
79	-	-	-	1	3	3	3
80	1	-	-	1	3	1	2
81	1	-	2	-	3	1	3
82	-	-	-	1	-	1	3
83	1	-	1	1	3	1	3
84	1	-	1	-	3	1	2
85	1	-	-	-	3	1	2
86	1	-	1	-	3	1	3
87	1	-	1	-	3	1	2
88	1	-	3	1	3	1	2
89	1	-	1	3	3	1	3
90	1	-	3	3	3	1	3
91	1	-	-	3	3	1	3
* 92	-	-	-	3	2	2	3
93	1	-	3	3	3	2	3
94	1	-	-	-	3	2	3
95	1	-	1	-	3	1	3
96	1	-	2	3	3	1	3

MULTI-RESOURCE SUITABILITY KEY TABLE

No.	G	T	L	M	W	H	R	No.	G	T	L	M	W	H	R	No.	G	T	L	M	W	H	R
97	1	-	3	2	3	1	3	129	-	-	3	-	1	1	3	161	1	2	-	3	2	1	3
98	1	-	2	2	3	1	3	130	-	3	3	-	1	1	3	162	1	2	-	3	1	1	3
99	1	-	3	3	3	1	3	131	-	2	-	-	1	1	3	163	1	2	-	3	2	3	3
100	1	-	3	2	3	1	2	132	-	-	-	-	1	3	3	164	1	-	2	3	2	3	3
101	1	-	2	2	3	1	2	133	-	-	-	-	2	3	3	165	1	-	-	3	2	3	3
102	-	-	1	-	3	1	3	134	-	3	-	-	1	3	3	166	1	-	-	-	2	3	3
103	-	-	2	3	3	1	2	135	-	-	-	1	2	3	3	167	1	3	-	-	2	3	3
104	-	-	3	2	3	1	3	136	-	-	-	1	1	1	3	* 168	1	-	-	-	2	1	3
105	-	-	2	2	2	1	2	* 137	-	-	-	1	1	3	3	169	1	3	-	2	2	3	3
106	-	-	-	3	3	1	2	138	-	-	-	3	2	3	3	170	-	3	3	3	2	3	3
107	-	-	-	2	3	1	2	139	-	-	3	3	2	1	3	171	-	2	2	3	2	3	3
108	1	-	-	-	2	1	2	140	-	3	-	3	1	3	3	172	-	2	-	3	2	3	3
109	1	-	-	2	2	1	2	* 141	-	-	2	1	2	1	3	173	-	2	1	3	2	3	3
110	1	-	-	2	1	1	2	142	-	-	2	1	2	3	3	174	1	2	1	3	2	3	3
111	1	-	-	-	1	1	3	143	-	-	-	3	2	3	3	175	1	2	3	3	2	3	3
112	1	-	-	-	1	1	2	144	-	2	3	-	1	3	3	176	2	-	1	-	2	1	3
113	1	-	-	1	3	1	3	145	-	3	2	-	2	3	3	177	1	2	1	3	2	1	3
* 114	1	-	-	-	2	1	3	146	-	2	3	-	2	3	3	178	-	2	3	3	1	1	3
115	1	-	3	1	2	1	3	147	-	-	2	3	2	3	3	179	1	2	3	3	2	1	3
116	1	-	3	1	2	1	2	148	-	2	-	3	2	3	3	180	1	-	3	-	2	1	3
117	1	-	-	3	1	1	3	149	-	3	3	3	2	3	3	181	1	3	1	-	2	1	3
* 118	1	-	-	3	2	1	3	150	-	2	3	3	1	3	3	182	-	2	3	-	1	1	3
119	-	-	3	1	1	1	2	151	-	2	3	3	2	3	3	183	2	-	-	-	2	1	3
* 120	1	-	-	1	2	1	2	152	-	2	-	3	1	3	3	184	-	3	-	-	2	1	3
121	1	2	-	-	1	1	3	153	-	3	-	3	2	3	3	185	2	-	-	3	2	1	3
122	1	2	-	-	2	1	2	154	-	3	1	-	2	3	3	186	-	2	-	3	2	1	3
123	1	2	-	-	2	1	3	155	-	3	1	3	2	3	3	187	-	2	-	3	1	1	3
124	1	-	-	-	2	1	3	156	-	-	3	3	2	3	3	188	-	-	-	3	2	1	3
125	1	-	-	2	1	1	3	157	-	-	1	-	2	3	3	189	-	-	1	3	2	1	3
126	1	3	-	-	2	1	2	158	-	-	-	3	1	3	3	190	-	-	-	3	2	3	3
127	-	-	1	-	2	1	3	159	-	2	-	3	1	3	3	191	-	-	3	3	1	3	3
128	-	3	1	-	2	1	3	160	1	-	-	3	1	3	3	192	-	-	2	-	2	3	3

MULTI-RESOURCE SUITABILITY KEY TABLE

No.	G	T	L	M	W	H	R	No.	G	T	L	M	W	H	R	No.	G	T	L	M	W	H	R
193	-	-	3	-	2	3	3	226	-	-	3	3	1	1	3	259	1	-	2	1	2	2	3
194	-	3	2	-	2	1	3	227	-	-	1	3	1	1	3	260	1	-	2	1	1	1	3
195	-	3	-	3	2	3	2	228	-	-	1	2	2	1	3	261	1	-	1	1	1	1	3
196	-	-	-	3	1	3	3	229	-	-	-	2	1	1	3	262	1	-	3	1	2	2	3
* 197	1	-	2	1	2	1	3	230	-	-	1	-	1	1	3	263	1	-	1	-	2	1	3
* 198	1	-	-	1	2	1	3	* 231	1	-	1	3	2	1	3	264	1	-	3	-	2	2	3
199	-	3	-	1	2	1	3	232	-	2	2	3	1	1	3	265	1	-	-	1	3	2	3
200	-	3	3	1	-	1	3	233	-	2	2	1	1	1	3	266	1	-	-	3	3	2	3
201	-	-	3	1	1	1	3	234	-	2	-	1	1	1	3	267	1	-	3	3	2	1	3
* 202	-	-	3	1	2	1	3	235	1	3	-	3	2	1	3	268	1	-	3	3	2	2	3
203	-	2	-	1	2	1	3	236	1	3	-	-	2	1	3	269	1	3	1	1	2	1	3
204	-	2	1	1	2	1	3	237	-	-	3	3	2	1	3	270	-	-	3	3	2	2	3
205	1	3	1	1	2	1	3	238	-	-	3	3	2	2	3	271	1	-	2	3	2	2	3
206	1	-	1	1	2	1	3	239	-	3	3	3	2	2	3	272	1	-	2	-	2	1	3
207	1	3	-	1	2	1	3	240	-	-	-	3	2	2	3	273	-	2	-	-	2	1	3
208	1	2	1	1	2	1	3	241	-	2	-	3	2	2	3	274	-	2	3	-	2	1	3
209	-	-	1	1	2	1	3	242	-	2	3	3	2	2	3	275	-	2	2	-	2	1	3
210	-	-	2	1	1	1	3	243	-	2	3	1	2	2	3	276	-	-	2	3	2	1	3
211	-	-	-	3	1	1	3	244	-	-	3	1	2	2	3	277	-	3	2	1	2	1	3
212	-	-	1	2	2	1	2	245	-	3	2	1	2	2	3	278	-	2	3	3	2	1	3
213	1	-	1	2	2	1	2	246	-	3	-	1	2	2	3	279	-	3	-	3	2	1	3
214	1	-	1	2	1	1	2	247	1	2	2	1	2	1	3	280	-	2	-	3	2	1	3
215	-	-	2	-	1	1	3	248	-	-	-	-	2	2	3	281	1	3	-	-	2	1	3
216	1	-	-	2	-	2	3	249	1	-	-	-	2	2	3	282	-	3	-	-	1	1	3
217	1	-	-	-	1	2	3	250	1	-	-	1	2	2	3	283	-	3	1	3	2	1	3
218	1	-	-	1	1	2	3	251	1	3	-	1	2	2	3	284	-	2	3	3	2	1	2
219	-	-	-	1	2	2	3	252	1	2	-	1	2	1	3	285	-	3	-	2	2	1	3
220	-	-	2	1	2	2	3	253	1	-	1	3	3	2	3	286	-	3	-	-	2	1	2
221	-	-	2	3	1	2	3	254	1	-	1	1	3	2	3	287	-	2	-	-	2	1	2
222	1	-	2	3	1	2	3	255	1	-	2	1	3	1	3	288	-	3	3	-	2	1	2
223	1	-	-	3	1	2	3	256	1	-	1	1	3	1	3	289	-	2	1	3	1	1	3
* 224	1	-	-	3	2	2	3	257	1	-	1	1	2	1	3	290	-	2	1	-	1	1	3
225	-	-	2	3	1	1	3	258	1	-	1	1	2	2	3	291	-	2	3	-	1	1	2

MULTI-RESOURCE SUITABILITY KEY TABLE

No.	G	T	L	M	W	H	R
292	-	2	3	-	2	1	2
293	-	-	1	-	2	1	2
294	-	3	2	3	2	1	3
295	-	-	2	3	2	2	3
296	-	2	3	3	2	2	2
297	-	2	3	3	1	1	2
298	-	2	-	3	1	1	2
299	-	-	3	3	2	1	2
300	-	2	1	3	2	1	2
301	-	-	1	3	2	1	2
302	-	2	1	3	1	1	2
303	-	-	-	3	2	1	2
304	-	3	3	3	2	1	2
305	-	2	2	3	2	1	3
306	-	3	2	1	3	1	3
307	-	3	2	3	2	2	3
308	-	2	2	3	1	3	2
309	-	2	1	3	1	3	2
310	-	2	3	3	2	3	2
311	-	-	-	3	1	1	2
312	-	2	-	3	2	1	2
313	-	2	1	3	2	3	2
314	-	3	3	3	1	3	3
315	-	3	2	3	2	3	3
316	-	3	2	1	2	1	3
317	-	3	2	1	2	3	3
318	1	-	2	1	2	2	3
* 319	1	-	-	1	2	1	3
320	1	-	-	1	2	3	3
* 321	1	-	2	1	2	3	3
322	1	3	-	1	2	3	3
323	1	3	2	1	2	1	3

No.	G	T	L	M	W	H	R
324	1	3	2	1	2	3	3
325	1	-	2	-	2	3	3
326	-	3	-	1	1	3	3
* 327	-	-	-	1	1	3	3
328	-	-	3	1	2	3	3
329	-	-	3	1	1	3	3
330	-	3	-	1	2	1	3
331	1	2	-	3	1	1	2
332	1	-	-	3	2	3	2
333	-	-	-	3	2	3	2
334	-	-	-	3	1	3	2
335	-	2	-	3	2	3	2
336	1	-	-	3	1	3	3
337	-	2	2	3	2	3	2
338	-	3	2	3	2	3	2
339	-	-	2	3	2	3	2
340	1	-	-	3	2	1	2
341	-	3	1	3	2	3	2
342	-	-	1	3	1	3	2
343	-	-	1	1	2	3	3
344	-	-	3	1	2	3	2
345	-	-	1	3	2	3	2
346	1	2	3	3	2	3	2
347	-	-	2	3	1	3	2
348	-	-	2	1	1	3	3
349	1	-	-	1	1	3	2
350	1	-	2	1	1	3	3
351	1	2	3	1	2	3	2
352	1	2	1	1	2	3	2
353	1	2	1	3	2	3	2
354	-	2	-	1	2	3	3
355	-	3	-	1	2	3	3

No.	G	T	L	M	W	H	R
356	-	2	1	-	2	3	3
357	1	-	1	1	2	3	3
358	1	-	1	3	1	3	3
359	-	2	1	-	1	3	3
* 360	-	-	3	1	2	1	3
361	1	-	-	-	2	3	3
362	1	-	-	-	1	3	3
363	1	-	-	1	1	1	3
364	-	2	-	1	1	1	3
* 365	1	-	2	1	2	1	3
366	1	-	2	-	2	1	3
367	1	-	2	-	2	2	3
368	-	-	2	3	1	1	2
369	-	2	-	-	1	1	2
370	1	-	-	1	1	1	2
371	-	-	-	3	2	2	2
372	-	-	-	3	1	2	2
373	-	-	1	3	1	2	2
374	-	-	3	-	2	2	3
375	-	-	3	-	1	1	2
376	-	-	3	-	2	1	2
377	-	-	3	3	1	3	3
378	-	-	1	3	1	2	3
379	-	-	-	3	1	2	3
380	1	-	-	3	1	2	2
381	1	-	-	3	1	1	2
382	1	-	-	-	2	1	2
383	-	-	1	3	2	2	3
* 384	1	-	1	3	2	1	3
385	-	-	-	3	2	1	2
386	-	-	1	3	2	1	2
387	-	-	3	3	1	1	2

MULTI-RESOURCE SUITABILITY KEY TABLE

No.	G	T	L	M	W	H	R	No.	G	T	L	M	W	H	R	No.	G	T	L	M	W	H	R
388	-	-	1	3	1	1	2	420	-	-	1	1	2	3	1	452	1	-	1	-	2	3	3
389	-	2	3	3	1	1	2	421	-	2	1	1	1	3	1	453	-	-	2	1	1	1	1
390	-	2	-	3	1	1	2	422	-	2	1	1	1	3	2	454	-	-	-	3	2	1	1
391	-	-	2	1	2	1	2	423	-	-	2	1	2	3	2	455	-	-	-	3	1	1	1
392	-	2	3	1	2	1	2	424	-	2	2	1	2	3	2	456	-	-	-	3	1	3	1
393	-	2	2	1	2	1	2	425	-	-	3	1	2	3	1	457	-	-	-	3	2	3	1
394	-	2	2	1	2	1	3	426	-	-	2	1	2	3	1	458	-	-	-	3	2	1	2
395	-	3	1	1	2	1	3	427	-	-	2	-	2	3	1	459	-	-	-	1	2	3	2
396	-	3	-	3	2	2	2	428	-	-	2	-	1	3	2	460	-	-	-	1	1	3	2
397	1	3	-	1	2	1	3	429	-	2	3	1	1	3	2	461	-	2	-	1	2	3	2
398	1	2	3	-	2	1	3	430	-	-	2	1	1	3	2	462	-	2	-	1	1	3	2
399	1	-	2	3	2	1	3	431	-	2	3	1	2	3	2	463	1	-	-	1	2	3	2
400	1	-	3	-	2	1	2	432	-	-	3	1	1	3	2	464	-	2	1	1	1	3	3
401	1	2	3	-	2	1	2	433	-	-	1	1	2	3	2	465	-	2	1	1	3	1	3
402	1	2	3	-	1	1	2	434	-	2	1	1	2	1	2	466	1	3	1	1	3	1	3
403	1	-	3	-	1	1	2	435	-	1	1	1	2	3	2	467	1	-	1	3	1	1	2
404	1	-	3	3	2	1	2	436	-	1	2	1	2	3	2	468	1	-	1	-	1	1	2
405	1	-	-	1	2	1	1	437	-	-	1	1	1	3	2	469	1	-	-	-	2	3	1
406	1	-	1	1	2	1	2	438	1	-	3	1	2	1	3	470	1	-	-	3	2	3	1
407	-	-	3	1	2	1	2	439	1	-	3	1	1	1	3	471	1	-	-	3	2	1	1
* 408	-	-	2	1	2	1	3	440	1	-	1	1	1	3	3	472	-	-	3	-	2	1	3
409	-	-	1	1	2	1	2	441	1	-	1	3	2	3	3	473	1	-	3	3	2	1	3
410	-	3	-	1	2	1	2	442	1	-	1	3	3	3	3	474	-	-	1	3	2	3	2
411	-	3	2	1	2	1	2	443	1	3	1	3	3	3	3	475	-	-	1	1	1	1	2
412	-	-	1	1	1	1	2	444	1	3	1	3	1	3	2	476	-	1	1	3	2	3	2
413	-	2	3	1	1	1	2	445	1	2	3	3	1	3	2	477	-	1	2	3	2	3	2
414	-	2	-	1	1	1	2	446	1	2	-	3	2	3	3	478	-	1	3	3	2	3	2
415	-	-	2	-	1	1	1	447	1	-	2	3	2	3	3	479	-	-	3	3	1	3	2
416	-	-	3	1	2	1	1	448	1	-	1	3	1	3	2	480	-	-	2	3	2	3	1
417	-	-	1	1	1	1	3	449	1	-	1	3	2	3	2	481	-	2	1	3	1	3	1
418	-	-	1	1	1	3	1	450	1	-	1	3	3	3	2	482	-	2	2	3	2	3	1
419	-	2	1	1	2	3	2	451	-	-	1	3	2	3	3	483	-	-	3	-	2	1	1

MULTI-RESOURCE SUITABILITY KEY TABLE

No.	G	T	L	M	W	H	R
484	-	-	2	3	1	1	1
485	-	2	2	1	2	3	1
486	-	-	2	1	1	3	1
487	1	-	2	1	2	3	1
488	1	-	3	1	1	3	1
489	1	-	3	-	1	1	3
490	1	-	3	1	1	1	2
491	1	-	2	1	2	1	2
492	1	-	2	1	2	3	2
493	1	-	-	1	1	3	3
494	-	-	-	-	2	3	2
495	1	-	-	-	2	3	2
496	-	-	-	-	2	1	1
497	-	-	-	-	1	1	1
498	-	-	-	-	1	3	2
499	1	-	2	-	2	1	2
500	-	-	1	-	2	1	1
501	1	-	-	-	2	1	1
502	1	-	-	1	1	1	1
* 503	1	-	2	1	2	3	3
504	1	-	-	-	1	1	1
505	1	-	-	-	1	3	1
506	1	-	-	-	1	1	2
507	1	2	-	1	2	1	2
508	1	-	-	-	2	1	2
* 509	1	-	-	1	2	3	1
* 510	1	-	-	1	1	3	1
511	1	-	1	1	1	3	1
512	1	-	1	1	1	1	2
* 513	1	-	1	1	1	1	1
514	1	-	1	1	2	1	1
* 515	1	-	-	1	2	3	1

No.	G	T	L	M	W	H	R
* 516	1	-	-	1	1	3	1
517	1	-	3	1	1	3	2
518	1	-	1	1	2	3	2
519	1	-	1	1	2	3	1
520	1	-	1	1	2	1	1
521	1	-	2	1	2	1	1
* 522	1	-	1	1	1	1	1
523	1	-	2	-	2	1	1
524	1	-	2	-	2	3	3
525	1	-	3	-	2	1	3
526	1	-	1	1	1	3	3
527	1	-	1	-	2	3	2
528	1	-	2	2	2	3	1
529	1	-	-	2	2	3	1
530	1	-	-	2	2	3	2
531	1	-	2	2	2	3	3
532	1	-	-	2	1	3	1
533	1	-	3	2	2	3	1
534	1	-	2	2	1	3	1
535	1	-	1	2	1	3	1
536	1	-	1	-	1	3	1
537	1	-	3	2	2	3	3
538	1	-	3	1	2	3	2
539	1	-	3	1	2	3	3
540	1	-	3	-	2	3	3
541	1	-	2	-	1	3	1
542	1	-	2	-	2	3	1
543	1	-	3	-	2	3	2
544	1	-	3	1	1	3	3
545	1	-	3	1	2	3	2
546	1	-	3	3	2	3	3
547	1	-	3	2	2	3	2

No.	G	T	L	M	W	H	R
548	1	-	2	1	2	3	1
549	1	-	1	-	2	3	1
550	1	-	3	-	2	3	1
551	1	-	3	3	1	3	3
552	1	-	-	2	1	3	2
553	1	-	1	-	1	1	1
554	1	-	3	1	2	2	2
555	1	-	1	-	1	2	2
556	1	-	-	1	2	2	2
557	1	-	-	-	1	2	2
558	1	-	-	-	2	2	2
559	1	-	3	-	2	2	2
560	1	-	1	-	2	2	2
561	-	1	3	1	2	3	2
562	-	1	2	1	1	3	2
563	1	-	2	1	2	3	2
564	-	-	1	1	1	3	2

* Duplicate

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